The Builder.

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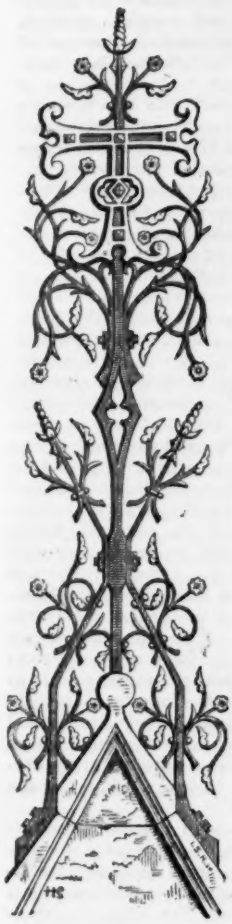

Cottage Hospitals.

THE first attempt to establish a cottage hospital was made at Cranley (by some spelt Cranleigh) in 1859, and we lost no time in bringing it under the favourable notice of our readers. Since then many others have been established, and in seven years, or in 1866, there were sixteen in full work and no less than sixty-seven in course of establishment. Nevertheless, a great many more are needed throughout the country. It has been calculated, on satisfactory data, that to supply the proper amount of hospital accommodation in rural districts, —setting aside London and the six principal cities, — one bed to every thousand inhabitants is the requisite proportion. Taking Mr. Swete's statistics as the basis of the calculation, it appears that there are (or were a year or two ago) no less than nine millions of people in Great Britain unprovided with hospital accommodation. To meet this state of things 9,000 more beds are required; and allowing six beds, on an average, to each hospital, there is scope and necessity for 1,500 cottage hospitals, scattered throughout the country, to meet the demand.

The advantages of cottage hospitals in villages and even towns are many. Besides those which affect the patients themselves, of which we will hereafter speak, there are other benefits which ought not to be lost sight of. Country surgeons and physicians are too often obliged to send off their poorer patients to some county hospital where they and their cases are lost sight of either partially or entirely, and valuable experience is thus lost to country surgeons and physicians which they might bring to bear upon any class. It is thus decidedly for the interest of the well-to-do classes in villages and small towns to support any movement for the establishment of a cottage hospital where it may be requisite in their own immediate district. The bringing of patients near the local surgeons and physicians where cottage hospitals are conveniently situated, is an important point too. As regards the patients themselves the advantages are various. It cannot but be promotive of cure in many cases where patients are not saddened by isolation from every relative or friend in a town or county hospital, even were their position equally favourable otherwise to their restoration to health; but of this there is good reason to doubt. We find it stated by some authorities that the proportion of deaths in cottage hospitals is no greater than in the London hospitals, where the most eminent and experienced surgeons of the day are engaged. This itself is much to say, but we are not inclined to accept it as anything like all that can be said in favour of cottage hospitals. Even were no larger proportion of cures effected in them than in London hospitals, a most important question to the poor man remains to be investigated, namely, how long time on an average it will take to cure any given case in a London hospital by comparison with the time requisite for just such a case in a cottage hospital. Of course much depends on stamina, and on other conditions; but something like reliable statistics, we think, might be ascertained on so material and important a point to the poor head of a family. The assertion that as many deaths in proportion occur in cottage hospitals, with some half-dozen patients in each, as in the London hospitals,—for that is what the ostensible recommendation, to which we have alluded, of cottage hospitals by comparison with London hospitals comes to,—we are by no means inclined to rest satisfied with in the face of the following declaration—not as to cases in cottage hospitals certainly, but as to those in cottage and other homes, to which the nearest thing is a cottage hospital. The cases referred to are not such as are casually treated in cottage hospitals neither, nor indeed in London hospitals with certain exceptions: they are cases of child-birth in cottage and other homes on the one hand, and in town maternity hospitals on the other. The difference of mortality in these respectively is enormous, and we cannot think that as between cottage hospitals and town or county hospitals in other cases such a difference can be all at once reduced to *nil*. Sir James Y. Simpson, one of the highest authorities in the kingdom on such a subject as that of which he writes, says, in a letter to the *Times* on "Hospital Reform":—

"In my address to the Public Health Section of the late Social Science Congress at Belfast I stated, as the result of Dr. Leon Le Fort's semi-official investigations, that, out of 934,781 parturient women delivered at their own poor and often very wretched homes, 4,405 died, or 1 in every 212; while out of 888,512 delivered in maternity hospitals, where every kind of professional care and comfort was bestowed upon them, 30,394 died, or 1 in every 29.

These statistics apply to hospital practice as compared with dispensary or home practice among the same class of women in the leading cities and medical schools of Europe. To the general law of the excessive mortality of hospital as compared with home practice, London is no exception. I find from the statistics published by Dr. Barnes that out of 4,000 women confined in the four chief maternity hospitals of London, 142 died, or 1 in every 28; while out of 18,383 confined at their own homes as dispensary or out-patients in connexion with the hospitals of St. Thomas and Guy, 53 died, or 1 in every 346."

That something similar must occur in any extensive enough statistical comparison of the general mortality in London hospitals on the one hand, and cottage hospitals on the other, we have no doubt.

Considering the good they do, cottage hospitals are most economical and easily supported establishments. In an account of them by Dr. Andrew Wynter, in *Good Words*, for May, 1866, he gives the following statement of the receipts and expenditure at the Cranley Cottage Hospital during four years, from 1859 to 1863, for 100 patients:—

Receipts.

Donations and subscriptions	£542	5	5
From patients	131	4	6
	£673	9	11

Expenditure.

For patients, salaries, wine, beer, &c.	£411	5	5
Insurance, printing, &c.	34	17	5
Repairs and improvements	73	11	4
Furniture	92	11	4
	£612	12	6

If we divide the total expenditure by four, we find that the annual cost, including furniture and repairs, was but little more than 150*l.* per annum; and, indeed, that the cost of the patients but little exceeded 100*l.* for the treatment of twenty-five patients, or 5*l.* as the total cost of each case. This cost is not all paid by subscription or donation: on the contrary, the hospitals are made as far as possible self-supporting, after they are once established, by weekly payments from the patients or their friends, who, under careful supervision, are also allowed to provide food, &c. In this case the sum contributed on the part of the patients themselves was 131*l.*,—an example of independence to our London artisans and others of the poorer classes.

There should be a cottage hospital in every village, ten miles distant from a town or county hospital.

With regard to the expense of fitting up an hospital for six beds, Mr. Napper, whose experience in the matter, at Cranley, gives great weighs to his opinion, places the cost at 70*l.* The cost of fitting up each bed he places at 9*l.* 7*s.* 5*d.* = 56*l.* 7*s.*, leaving about 13*l.* for a kitchen-range, dresser, bath, clock, an easy-chair, table, &c.; but in the estimate no mention is made of crockery, cooking utensils, and some other minor articles. Dr. Waring estimates the cost of furnishing at 80*l.* This sum, added to 20*l.* for repairs, will give a total of 100*l.* With this amount in hand (raised by private donations, sermons, bazaars, or otherwise), any one would be fully justified in at once establishing a cottage hospital of six beds (inclusive of one for the nurse), in any district with 5,000 inhabitants placed beyond ready access to another hospital.

Cottages, of course, can often or generally be had for the purpose ready built, at rents of 12*l.*, as at East Grinstead, where Dr. Rogers presides, to 16*l.*, as at Tewkesbury; but it is not considered advisable to exceed the latter sum except under special circumstances. One great fear which those experienced in the working of cottage hospitals have is, that the system may be elaborated into some costly or ponderous arrangements which would diminish the chances both of the multiplication of such hospitals, and of effecting all the good of which the more primitive and economical system is capable. The subject of fever cases has been considered, but it has been thought better to exclude these, and to rent temporarily a separate cottage for any special occasion of the kind. Memorial cottage hospitals are not a bad idea if the limits be not extended, and the purposes be confined simply to the cure of such cases as those undertaken at present in cottage hospitals.

When the erection of a cottage hospital is contemplated, the best plan is to place the matter in the hands of a respectable local architect, with instructions to conform as nearly as possible to the character of the neighbouring cottages, striving, however, for as much air and light as practicable. The rooms required, according to Dr. Waring,* are,—

"Upstairs: 1, men's ward for three beds; 2, a women's ward for two beds; 3, a small ward, with one bed, for a case requiring separation; 4, a nurse's bed-room; 5, an operating room (lighted from above), to contain the medical and surgical stores; and 6, a bath-room. On the ground-floor: 7, kitchen; 8, scullery; 9, sitting-room; 10, store-room and larder; and 11, water-closet. In addition to these, there should be a small mortuary chamber with a skylight, and sheds or cellars for coal and wood. Such a building, he adds, I am informed by those capable of judging, should cost about 400*l.*; but this would differ according to the price of materials, which varies much in different localities."

The surroundings of cottage hospitals, drainage, &c., ought to be carefully looked to.

A proposal was made last year by Mr. Horace Swete to establish a National Cottage Hospital Association. He considered that such an association would be of value—1, in starting new cottage hospitals; 2, in framing a general scheme of rules for their more effectual operation; 3, in diffusing through their means a sound knowledge of sick nursing and sick cookery; 4, in helping, by a central fund, poorer districts to commence cottage hospitals; 5, in arranging meetings of cottage hospital medical officers annually, for the discussion of matters

* Cottage Hospitals. By E. J. Waring, M.D. Churchill & Sons. 1867.

connected with this class of institutions; 6, in undertaking the arrangement of questions affecting poor law unions, &c.; 7, in publishing a quarterly paper with information as to the progress and working of the system; and 8, in furnishing plans for building, and other such information as might be required.[1]

ON THE UTILIZATION OF SEWAGE BY IRRIGATION.

Introductory.

The records of all countries which, in the history of the world, have arrived at any prominent degree of civilization, bear witness to the important consideration which has ever been bestowed upon the subject of the drainage of cities. A comprehensive digest of these ancient records, such as has yet to be written, would, indeed, form a most valuable addition to what is already known on a subject so full of interest, and concerning which there is such a diversity of opinion. As populations increased, and a certain degree of refinement became a necessity, the rude and primitive habits incident to savage life were cast aside for the systematic purging of great communities of the accumulations of residue and filth which mark the gregarious condition of man. Hence originated that important branch of modern science,—hydraulic engineering.

Much as we are apt to pride ourselves on the development of the infinite resources of our modern civilization, it cannot be doubted that even our most advanced hydraulic works must yield in solid grandeur of design and execution, if not in scientific perfection, to many whose ancient splendour may still be traced through all the ravages of time. When we compare the precarious water-supply of modern London, estimated by Mr. Bazalgette at 5 cubic feet, or 31·25 gallons per head per diem, and by Messrs. Hoffman & Witt at 7 cubic feet, or 43·75 gallons per diem,[2] with the supply of ancient Rome under the Emperor Nerva, which is recorded in a treatise by his inspector of aqueducts, at 50 cubic feet, or 312 gallons per head per diem, it is difficult to overrate the advantages of the Roman in this respect.

Where, also, the supply of the pure element was so prodigious, there was equal provision for its drainage after being rendered subservient to the uses of man; so that it is not too much to say that in spacious magnificence the *cloacæ* or sewers of imperial Rome have never been surpassed. In other countries of antiquity—Greece, Egypt, India, and Assyria, as well as throughout the whole of those nations of Southern Europe assembled under the imperial domination—we have similar instances of the high estimation in which water supply and drainage were held. That which, in a sparse and scattered population, and under the rudest periods of the human intellect, was not deemed, nor was in reality, a nuisance, became, by the concentration of people in cities, with their multiplied wants, a matter which thrusting itself upon the public attention, could no longer remain in harmless obscurity, but loudly called for proper treatment. It is true we have no authentic instance of the application of sewage to the soil on a scale approaching to that upon which it is now proposed to deal with this commodity; nor, perhaps, would there be the need of such a measure under the ancient condition of things; for, when we consider the almost unbounded dilution of sewage, where a daily bath was indulged in by every member of the community, gentle or simple; where the very beggar had at his service baths of such extraordinary magnificence that modern Europe can, by comparison, form no adequate conception of them; when we recollect that water-closets were unknown, and that the more solid and offensive parts of sewage were conveyed and distributed over the land,—it may readily be conceived that the blending of riverine and drainage waters would not be attended by any such disastrous results as occur in the present age. What was passed into the broad streams upon whose banks all large cities of antiquity were built, mingled with their strong currents, and was swept so rapidly down to the sea that time was not allowed for decomposition.

Moreover, it must not be forgotten that, although the ancients were by no means, as is often erroneously stated, ignorant of the principles of hydraulics and hydrostatics, yet a knowledge of the natural laws of fluids, unaccompanied by the resources of modern invention in mechanical appliances, would in many cases form an insuperable drawback. Had the engineers of ancient Rome commanded the agency of so powerful an auxiliary as the steam-engine, or could they have obtained cast-iron pipes capable of resisting the pressure of a column of water of indefinite height, doubtless they might have solved many a problem which has puzzled later ages, and have dispensed with those stupendous arched aqueducts which are at once the envy and the theme of criticism of their modern successors.

But although the drainage waters of towns may not have been turned to account for agricultural purposes, yet from time immemorial water-irrigation,—its kindred science,—has been practised in all warm countries which have attained any degree of advancement in the tillage of the soil, and it may reasonably be asked why, if pure water alone be beneficial to the land, water containing the undoubted elements essential to the growth of vegetation should not be more so. Before, however, we enter into an inquiry as to the effect of sewage applied to soils, it will not be irrelevant to take a brief view of those causes which in this country have led, we may say so suddenly, to the eminent importance of this subject; from which we may perhaps see that, despite our ingenuity in striving after cleanliness, we have as yet merely succeeded in shifting the locality of the disease, without in any degree eradicating it from the constitution; or as some hold, that in efforts to rid our habitations of their necessary refuse with as little delay as possible, we have converted a transitory sore into a fixed and dangerous ulcer of the gravest kind.

Town Drainage with reference to Water Supply.

That "cleanliness is next to godliness" is a saying for which we have very high and ancient authority, and if we consult the records of religions ordinances from the earliest ages we find that in the performance of sacred rites frequent ablutions form a never-failing ingredient. In Holy Writ we are told that such ablutions were strictly enjoined under grave penalties, and the washing of feet was an invariable act of hospitality towards the wearied traveller. It is true that the climate in some degree necessitated a certain standard of cleanliness, more especially as touching the curse of leprosy; and that the Hebrew of colder countries has not always been distinguished for his impartial observance of this duty; but, nevertheless, the very existence of such ordinances appears to point out the fact that uncleanliness of the body was deemed unholy and incompatible with devoutness of the soul. In all Mahometan and Oriental countries these rites are held in the highest respect, and the neglect of them, which travellers occasionally notice, arises chiefly from the scarcity of the precious liquid under a burning sun. In our own country, as in all modern nations, it is only of late years that a frequent use of water has become at all tolerated, and even yet the great masses of the population of Christendom are far behind the followers of the Prophet in this regard, and are not untruthfully described as the "great unwashed." So advanced, indeed, is the Oriental of higher rank, even beyond the fastidious cleanliness of the English gentleman, that in his ablutions running water alone will serve his purpose.

Until nearly two centuries and a half ago there was no regular supply of water to the metropolis, and the construction of the New River works, by Sir Hugh Myddeltor., was considered a prodigy of human skill. Since then there have been sundry additions made from time to time by way of auxiliary supply; but until a period within the recollection of the present generation there was no marked alteration in the water supplies of our towns. The use of the bath was a luxury, and as such, unknown to nineteen-twentieths of the population; water-closets were still in futurity; manufactures by steam-power had but arisen from their infancy; and what was sent through the miserably incomplete systems of drainage then extant was in fact little else than the household drainage and a portion of the rainfall. So slight an admixture of sewage in the large volumes of our rivers was therefore comparatively harmless; and up to a very recent period their waters, with a few exceptions, such as in the clothing districts of the West Riding of Yorkshire, were clear and pure, and abounded in fish.

But when the refinements of modern civilization caused the erection of watercloseta, and were supplemented by an increased water-supply to the towns; when new and complete systems of main drainage were adopted, by means of which masses of filth, which before had been allowed to stagnate and rot under the noses of the inhabitants, until hoisted into the farmer's wagon, were swept down into the nearest watercourse, then the attention of the public became drawn to the baneful results of river pollution.

The defiling of the great source of our water-supply is indeed the price we pay for the abolition of the pestilent dung-heaps, reeking gutters, and other uncouth and unsavoury practices of our ancestors, such as in Smollett's time were to be found in Edinburgh, and which would shock the nice manners of the present day. Cesspools were at first instituted, and in many towns it was made a punishable offence to allow water-closets to drain into the sewers. It was not long, however, before the authorities discovered that, in avoiding Scylla, they had lighted upon Charybdis; and with improved sewerage it was found better to suffer fœcal matter to pass into the drains and so into the rivers, than to harbour in the vicinity of each dwelling the ever-accumulating abominations of the cesspool, which were enough to poison the water of every well in their neighbourhood, and breed a pestilence in the land. Speaking on this subject, Mr. Rawlinson, principal inspector in the Local Government Act Office, says:—"The most dangerous condition for a cesspool is for it to be covered; if you are to have cesspools, the safest plan is to take the top off, and let the gas be constantly diluting. In Paris, cesspools are constructed under the superintendence of the authorities, who profess to make them water-tight by hermetically sealing them. This is a fallacy, as the gas escapes at the joints."[1]

The failure of cesspools to meet the sanitary requirements of a town, has mitigated the prohibition clauses in Corporation Acts, and the discharge of water-closet refuse into the sewers has become wellnigh universal. The influx of so enormous a volume of organic matter, rendered doubly pernicious by the immense increase of manufactures, and the numberless river-weirs, which in dry weather divide them into long, stagnant reaches, has had its due effect on our rivers; so that in all our populous districts their one-time pure waters have been converted into so many masses of unsightly sewage, whose sight and smell are offensive, and whose effect is to breed subtle and dangerous epidemics.

Lest, however, there should be any misunderstanding in the minds of the reader as to the just proportion of the effect of manufactures upon river waters, it must not be omitted to state, that although positively the effect of *all* foreign and discolouring matter is to deduct from their wholesomeness, yet relatively it may be otherwise; as when a certain kind of pollution may be neutralised by the introduction of polluting matter of a certain other kind, which is undoubtedly the case in regard to the infusion of the acid refuse of dye-works amongst currents polluted by town sewage and other animal refuse. The statement of the Rivers Pollution Commissioners, in their report on the Aire and Calder rivers, vol. i., page 14, sets this matter in a clear light:—

"The dark and foul appearance of the West Riding rivers is mainly due to insoluble dye-matter discharged from the works; but dye refuse in general, though in this sense highly objectionable, really tends, to a considerable extent, by the disinfecting action of the mineral ingredients and acid it contains, to neutralise the corruption of town sewage. Where, on the other hand, this dye refuse is not discharged in sufficient quantity, that offensive matter deposited on the beds and banks of the streams, becomes, in dry weather, putrid and stinking."

In many parts of the West Riding clothing districts, where large and increasing towns are situated on the banks of comparatively small streams, recourse is had to reservoirs. Periodically, once a week, or once a month, these are flushed out, generally on a Saturday afternoon, and the whole of the deposit of "sludge" and refuse is sent down the stream. During these

[1] The experiment made by the Marchioness of Ailesbury in establishing a cottage hospital at Savernake, near Marlborough, appears to have succeeded admirably. At the annual meeting held under the presidency of the Marquis of Ailesbury, K.G., the report was read by the Rev. J. O. Stephens, honorary secretary to the institution, and the document showed that during the past year an addition of 144*l.* had been made to the endowment fund. It was also reported that seventy-nine cases had been received into the hospital (making up nine beds only), forty of which were discharged cured, twenty-eight were relieved, two pronounced incurable, and two fatal.

[2] Report on Metropolis Sewage, 1864. Mr. Ellis's evidence: 1744.

[1] Rep. Metropolis Sewage, 1864: 4219, 4220.

flushings the water of the stream is defiled to such an extent as can hardly be realised by those who are non-resident. The neighbourhood of Bradford, Dewsbury, Batley, and Heckmondwike, is especially distinguished by this characteristic.

How, then, to deal with an evil so gigantic and so rapidly increasing, is a matter which has naturally attracted the attention of the scientific men of the time, and innumerable remedial schemes have been proposed. In order to form a correct estimate of the most prominent of these, it will be proper to ascertain, as far as possible, what sewage is; what are its constituents, what its capacities, and what is its commercial worth.

Sewage: its Constituents and commercial Value.

In the earliest stages of the inquiry into the best means of restoring our rivers to their pristine purity, the chief source of encouragement was the fact that the liquid hitherto wasted to the detriment of the public, contained all the most valuable elements of manure, which but required to be applied in a proper manner to become a permanent source of revenue. In spite of the example of the Edinburgh meadows, where for nearly two centuries sewage has been profitably utilized, many schemes for merely purifying the liquid, without any view to turning the residue to account, have been entertained, adopted, and in almost every case abandoned, to the neglect of the sounder principle of utilisation.

Perhaps the best definition of sewage in its present application is, the condition of water after it has served all the purposes of mankind, and contains the impurities disgorged by water-closets, kitchens, washhouses, hospitals, tanneries, slaughterhouses, knackers' yards, dye-works, and manufactories of every description, the washings of streets, housetops, &c. That this refuse holds in solution the most essential ingredients of fertility in the form most adopted to their beneficial application, is a fact now established in the opinions of those who, as chemists, agriculturists, or engineers, have especially devoted their studies to the development of this branch of political economy; the chief exceptions being on the part of those who advocate the dry-earth system of closets, and those who are interested in the production of artificial manures. But the history of sanitary reform for the past quarter of a century shows how slow this truth has been in gaining upon those whom it most concerns.

During that period time, money, and careful research have been abundantly bestowed upon experimental dealings with sewage, chiefly in pursuit of precipitates, mediums of filtration, and similar remedies. But it can be no error to state, that notwithstanding the manifold inventions, which from time to time have been set forth, a practical and undoubted remedy of this nature has yet to be produced; on the other hand, the practical results of sewage irrigation would appear to have placed the theory of utilization upon a solid basis of fact—an eminence which no other remedy has reached.

Careful analyses by some of our most eminent chemists have shown that town sewage contains ammonia, phosphoric acid, potash, and other fertilizing ingredients, which, having been abstracted from the land in the process of agriculture should logically be restored in their transmuted form.

Professor Way, consulting chemist to the Royal Agricultural Society, says that the average of ninety-three analyses of Rugby sewage showed 7¼ grains of ammonia to the gallon. He made similar experiments with London sewage at different points, and found it to vary from 7½ to 18 grains per gallon; but the results appear inconsistent, as the same gentleman states that the value of London sewage, as compared to that of Rugby, is as 60 to 100, or six-tenths.[1]

Mr. J. B. Lawes, manufacturer of artificial manures, appointed by Government to conduct experiments in sewage at Rugby, found, in 1861, that the proportion of ammonia in a gallon of Rugby sewage was 6·39 grains; 1862, 6 grains; in 1863, 6·75 grains, besides potash, phosphoric acid, and a variety of valuable salts. The quantity of ammonia given would amount to three or four ounces to the ton, and he valued it at 8d. per pound.[2]

Boussingcault says, that supposing the excreta of man to amount only to 1½ lb. per day, and that they contain 3 per cent. of nitrogen, in one year they will amount to 547 lb., containing 16·4 lb. of nitrogen,—a quantity sufficient to yield the nitrogen of 800 lb. of wheat, rye, or oats, or of 900 lb. of barley.[1]

The agricultural value of these manurial ingredients has been variously estimated by a host of authorities, some of whom base their calculations on analytical results, some on actual experience, and some on a well-digested combination of the two. These estimates are given below; and, in order that a definite conclusion may be found as to the gross value to the nation of this important commodity, we prefix the annual quantity of London sewage, as estimated by Mr. Bazalgette, Captain Galton, and Mr. Ellis:—

Mr. Bazalgette	155,544,000 tons.
Captain Galton	215,762,000 ,,
Mr. Ellis	266,000,000[2] ,,

Baron Liebig is of opinion that the value of sewage is 1½d. per ton.[3]

Sir Charles Fox places it at the same figure, but says that 1d. per ton is more than can be obtained.[4]

Mr. B. Latham stated, at the sewage congress at Leamington, 1866, that 6s. per head of the population contributing to contributing to the sewers had been realized at Croydon and South Norwood.[5]

Messrs. Hoffman & Witt state that 1,250 tons of sewage contain as much fertilising matter as one ton of guano, the value of guano being from 11l. to 14l. 10s. They also estimate the money value of the excreta of each person, based on the analyses of Liebig, Way, Wesarg, and others at 10s. 10d. annually.[6]

Mr. Ellis, taking Messrs. Hoffman & Witt's estimate, calculates the gross value of the London sewage at 2,793,000l., guano being taken at 11l. per ton.[7]

Mr. Lawes's estimate of the London sewage is 1d. per ton; its value as compared with guano as 1 to 3,000.[8]

Professor Way considers the value of the ingredients of Rugby sewage to be from 1d. to 1½d. per ton, but does not consider the ingredients of London sewage to be worth so much. He also affirms that the chemical value of the ingredients cannot be taken as a test of the commercial value of the sewage itself.[9]

Mr. Hope says that the theoretical value of the manurial ingredients of sewage, based upon the opinions and analyses of the chief scientific authorities, is on the average 6s. per annum per head of the population.[10]

Dr. Thudichum finds, by careful analysis, that the annual solid and liquid voidings of an adult male are worth 10s.[11]

Mr. George Shepherd estimates sewage to be worth, in wet weather, 1d. per ton, and in dry weather 2d.; and on the average, 1¼d. per ton.[12]

Mr. Lawes, before the Royal Commission, stated in evidence that the application of 1,000 tons of sewage to the soil would result in the increase of milk to the value of 5l. 19s. 10d.; from which it would appear that one ton of sewage represents a value of 1⅞d.[13]

Mr. C. W. Johnson, chairman of the Croydon Board, considers that, according to analysis, the sewage of Croydon and that of London are of the same strength.[14]

The evidence laid before the Commission on Metropolis Sewage, 1864, led it to the conclusion that the manure which sewage contains can be applied in the cheapest manner when conveyed in water.[15]

From the statements collected above it will be seen that, although there appears to be a diversity of opinion as to the precise monetary value of town sewage, yet the one least favourable,—that of Mr. Lawes, an extensive manufacturer of artificial manures,—tends to show that in fouling our water-supply by the discharge from sewers, we are, in a pecuniary sense, as well as in a sanitary sense, carrying out a suicidal policy. It is no new discovery that our present supply of manure is but from hand to mouth; that guano is yearly increasing in price as it is decreasing in quantity, and will be exhausted in another generation; that our bone-manure manufacturers are so hard put to it that even the pits of Sebastopol have been stealthily disgorged to recruit the impoverished soil of this country;[1] and if it be an axiom in political economy that in all the bare necessities of life a nation should be self-supporting so far as within it lies, it is certain that we can strike no heavier blow at the foundations of our national welfare than by undervaluing a matter of so great importance; a policy which, if persisted in, cannot fail to throw this country, year by year, into deeper dependence upon foreign nations, which are thus empowered, in any period of strife, to deprive us of the very elements of existence. The sewage of a nation upon whose soil the progress of agriculture is yearly making heavy draughts, may be said to represent its food in another shape, and in casting it away to irreclaimable loss the natural reproductive powers of the land are rendered impotent, and, without foreign importation of fertilizing matters, exhaustion ensues.[2]

That country in which this policy is pursued may be likened to one of those vast inland seas of North-western America, which, having at some bygone period been severed from the ocean by the upheaval of the bed or channel of communication, and being without other sufficient source of supply, is gradually diminished by evaporation, until at last a dry stratum of salt alone indicates its ancient condition. It cannot be supposed that even should the wealthy pre-eminence of this country be sustained in future ages, we shall always be enabled to import the materials of fertility at will; and when once the balance of giving and taking between the soil and its inhabitants is overcome to the prejudice of the former, a national atrophy must set in,—a result which a timely wisdom in the matter of the utilization will avert. It is a truism in agriculture, that if all the refuse of the products of the soil be restored to it, land is self-supporting. Belgium, a more thickly-populated country than our own, where sewage is generally utilized, is stated to import none of the chief staples of food, whilst already in this country the sum of 30,000,000l. in hard cash is annually paid for foreign supplies.

The agriculture of the empire of Japan, which, perhaps, affords the only complete system of the utilization of sewage in existence, may also be fairly pitted against our own. That remote country, of similar extent to Great Britain and Ireland, and one-half of which is unfit for cultivation, not only maintains a larger population than the United Kingdom, but maintains it without the introduction of any foreign supply of food, and we are even told[3] that it actually exports considerable quantities.[4] M. P.

THE CAPABILITIES OF ARCHITECTURE AS A DISTINCT BRANCH OF INTELLECTUAL RESEARCH.

THE relation of architecture to history is no recent discovery. It is true that, with every fresh contribution afforded by the enterprise and the patience of modern explorers to our increasing knowledge of the past, the value of this relation becomes more apparent. Every ancient building that is distinctly and satisfactorily investigated adds a new chapter, not indeed to history itself, but to what our clear thinking neighbours call "*Mémoires pour servir à l'histoire.*" The exact date of the foundation of the structure, the obvious purpose of its erection, the mode by which the architects of that date dealt with problems that, under any phase of civilisation, recur within certain limits, are matters requiring a careful study, the chief disturbing element in the course of which arises from doubtful questions as to restorations and alterations. The

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1 Rep. Metropolis Sewage, 1864: 4833, 43, 90.
2 Rep. Metropolis Sewage, 1864: 4434-36-40.

1 Rep. Metropolis Sewage, 1864: p. 334, appendix.
2 Rep. Metropolis Sewage, 1864, pp. 389-90. Mr. Ellis's calculation is based upon that of Mr. Bazalgette, adding thereto two-thirds of the estimated rainfall.
3 Rep. Metropolis Sewage, 1864: 1267.
4 Rep. Metropolis Sewage, 1864: 1267, 1565.
5 Leamington Congress Papers, p. 82.
6 Rep. Met. Sewage, 1864: 1736-80.
7 Rep. Met. Sewage, 1864: 1767.
8 Rep. Met. Sewage, 1864: 4590-4632.
9 Rep. Met. Sewage, 1864: 4892, 4843.
10 Rep. Met. Sewage, 1864: pp. 405-6, app.
11 Rep. Met. Sewage, 1864: p. 301, app.
12 Rep. Met. Sewage, 1864: 1618.
13 Rep. Met. Sewage, 1864: 4333.
14 Rep. Met. Sewage, 1864: 2200.
15 Rep. Met. Sewage, 1864: p. iv. Introductory Report.

1 *Times*, 23rd Dec., 1859.
2 "Of all the elements of the field which, in their products, in the shape of corn and meat, are carried into the cities and there consumed, nothing, or as good as nothing, returns to the fields. It is clear that if these elements were collected without loss, and every year restored to the fields, these would retain the power to furnish every year to the cities the same quantity of corn and meat; and it is equally clear that if the fields do not receive back these elements, agriculture must gradually cease." — Baron Liebig's letter to the *Times*, Dec. 23, 1859.
3 "Report on Japanese Husbandry." By Dr. H. Maron, Member of the Prussian East Asiatic Expedition. *Vide* Liebig, in the "Natural Laws of Husbandry," app. pp. 386-398. Dr. Maron's report contains a graphic and interesting account of the Japanese method of dealing with fœcal matter.
4 To be continued.

distinct and minute examination of a single building of architectural magnitude and of known antiquity, when the dates of the several portions of the structure can be ascertained, and when the efforts of the restorer or the adapter are absent, or are to be distinctly traced and accounted for, may be more valuable, as providing an exhaustive monograph, than many a wider and more ambitious description of a collection or of a series of buildings.

It may be said that we are speaking not of architecture, but of archæology. We will not pause to quarrel about terms, but it must be admitted that unless the word architecture be held, in its highest and most comprehensive sense, to include the whole doctrine of human structural abode, we are in want of a term that shall comprehend all the branches of that study. The decorative and the structural portions of the building art are in themselves separate branches of the subject, and, although the highest excellence must be thought to be attained when structure is decorative, and when decoration is structural, this happy result can only be arrived at by a full mastery at once of the science, and of the art, of architectonic design. Historic architecture is, no doubt, properly neither a science nor an art, but a method of investigation. It is, however, a necessary portion of the full knowledge of the subject of building, and a broad and marked line may be drawn between this portion of antiquarian research, and that which inquires into the weapons, the food (and therefore the habits of hunting, of pasture, or of agriculture, indicated by the relics of consumption), or even into the sepulture, of ancient races. It is, therefore, rather to maintain distinctness of expression than with the view of attempting any redistribution of terms, that we speak of the study of architecture, in the highest sense, as including the archæology of building.

Thus far we shall, no doubt, have the assent and the sympathy of all those who like to think on the subject. But we wish to carry the antiquarian portion of the subject a step further, and to refer to the value of architecture as a distinct method of intellectual research, one capable, if properly pursued, of obtaining results not dissimilar to those with which the study of philology is now extending the limits of our knowledge of the past. We cannot admit the claim of Professor Müller to call his favourite pursuit an independent natural science; but the difference, after all, is rather in expression than in idea, and as a distinct and in some sort independent portion of the natural history of mankind, philology is no doubt assuming new and most unexpected proportions. But if speech, so far as its gradual transformation can be now recalled, and, as it were, disinterred, by the labours of the philologist, be an external sign of the intellectual, moral, and social state of those whose utterance it formed, no less importance must attach to the similar indication of what has been committed to architectural record. The mind of the architect is, to some extent, reflected in his building; it is the outward expression at once of the habits and requirements of the age, of its intellectual progress, as marked by the mode of dealing with the known difficulties of the structure, and, more than all, of that advance either in general professional culture, or in the culture of the individual architect, that gives the impress of character to his works.

Again, in the study of spoken language, difficulty arises from many casual and incidental causes which may altogether escape the researches of the inquirer, although their results may so materially influence the state of the subject of his investigation that ignorance of them will altogether mislead him. Thus the habit of certain tribes of occasionally dropping words altogether from their language, and of replacing not only these words, but their component sounds or syllables when they form part of another word, by something of corresponding meaning, but of altogether different vocal formation, if undetected as a fact, would never have been imagined as a possibility. The name of a king, for example, on his accession or on his death, is thus "tabooed." Early and simple names are invariably significant, and the forbidden sound is thus replaced by one which has no vocal relation with its character, but more or less corresponds with its meaning. It is as if, on the accession of the Norman Conqueror, not only the word "will," and all its compounds, but the sound itself as a syllable had been suppressed in this country, excepting for the sole duty of indicating the sacred name of the sovereign; and not only should we speak exclusively of a last "testament," in referring to the devise of property, but we should call a wilful man a "testament-ful" man, or a willing horse a "devising" horse.

Against the result of vagaries of this sort, the investigator of the historic teaching of architecture is entirely protected. Casual disturbance, so to speak, is generally of local origin in individual buildings; and thus, from the permanence of the cause, tends to explain itself. Brick may be substituted for stone. The reason will be evident from examination of the site. Material of an unusual description may offer itself to the hand of the builder. The result is to be traced in a richness of ornament, or in a severity of design, that is unusual for the date, but that is at once understood by any one familiar with the locality. Thus the stone palaces of Lecce, and some neighbouring cities and towns on the Adriatic sea-board, burst on the eye with a bold luxuriance of ornament which is peculiar to the locality. You trace on the door-jambs of the humblest houses foliage and arabesques fit to adorn a highly-finished mansion. The gargoyles of the ancient monastery which now forms the palace of the prefect of Lecce start from the wall as life-size, half-length, human figures. The ornamentation of the entire façade is of corresponding boldness, and of admirable finish. You look for the cause, and you find it in the character of the stone quarried on the spot, soft as chalk beneath the knife or chisel when freshly brought to the air, and gradually and permanently hardening into a most excellent and durable stone. Material such as this irresistibly tempts the mason to become a statuary. Thus a difference between a church or palace of a given date in the city of Lecce, and a specimen of similar and contemporary buildings some forty or fifty miles distant, which would perplex the student who learned the details from the pencil of others, ceases to require any explanation on a visit to the spot. While, therefore, the casualties that beset the subject of the research of the philologist are such as often to mock his utmost skill, those which render the work of the architect *bizarre* or abnormal may generally be traced to their actual source, and thus increase, instead of interfering with, the amount of knowledge obtained by the inquiries.

When positive historic date can be assigned to an ancient building of importance, when questions of restoration and alteration can be eliminated, and when to the local circumstances tending to impress a special and peculiar character on the work due importance has been assigned, we see, in the form and details of the building, evidence of two distinct elements. The first is the social indication which it affords. In size, in position, in arrangement we see the marks of the state of society for which it was designed. Is it a lonely and carefully strengthened tower, erected on an inaccessible hill?—we see marks of a state of civil discord, of the rule of the strong hand, and of the habits of the "robber chivalry" who ensconced themselves in stone for their dwellings as they did in iron for their garments. A spacious church tells of a people whose time, and whose devotion, would allow and would impel them to worship beneath its roof, and to swell the processions of the clergy. Such a simple matter as the direction in azimuth of the plan, or the exact orientation of the building, may tell of the religion of those who built sepulchres, or of the astronomical knowledge of those who raised pyramids or obelisks. At Cumæ three stories of sepulchres are superposed. Each series differs as much in its orientation as in its structure. The lowest, the rudest in construction and the rudest also in the relics which they contain, follow no fixed rule, but appear to have been dug as caprice or convenience dictated. Then came a race who laid their dead with their feet to the south; then one who turned their last couches towards the east. It is clear that a large amount of indication of the social state of mankind is to be drawn from a knowledge of what, at any period of their history, they expected from the art of the builder.

Intellectual progress and status, on the other hand, is shown by the manner in which the architect met the requirements of the day. This, indeed, depends on two conditions,—the general and the special state of his knowledge. To a certain extent the architect is always conventional; he arrives at given results by a customary mode. His individual genius may improve this mode, his poverty of spirit may fall short of its best expression; but, on the whole, his work will prove an intellectual gauge of the professional merit of his period. Thus he has a space to cover, with superincumbent weight to support. He begins by the use of ponderous and misshapen lintels, after abandoning the simple inclination of two jambs towards a vertical line. Then he dressed his lintels and stepped them so as to throw their weight in part on a second course of masonry. Then he hollowed them from below, and produced a pseudo arch. Then he vaulted from pier to pier, with small and timid span, indeed, but with a firm grasp of that master-principle of masonry which later, in its bolder applications, produced structures that so far excited the wonder of those not initiated in masonic science as to be pretty generally attributed to the agency of Satan. You may not be able to detect how far each step in the steady and long progress is due to each worker in the series; how much of the advance is due to the pupil, and how far to the master. You may hesitate, for instance, whether to admire or to blame Brunel for the first arch he threw over the Thames at Maidenhead; but if you compare the freedom of the present structure, over which such heavy loads are whirled with such immense velocity, with the steep ascent and the numerous and picturesque arches of the old road bridge over the same river close by, it is impossible to disguise the fact of the immense difference of intellectual level at which the successor of Brunel must start as compared to the successor of the architect of the earlier bridge.

With the change in the requirements of social life, and the advance in the scientific and practical power of the architect, we can at times also trace the history of the development of principle, and of the gradual transformation of idea,—a class of observations of extreme interest in dealing with the intellectual history of mankind. Thus, at a time when the column in Roman architecture had been most thoroughly conventionalized, and when proportions had been fixed within distinct dogmatic limits, we find the simple columnar pier of the Saxon or Early Norman architect constructed on a no less definite rule, but one which he had not borrowed from the Roman invaders. It was a structural, not a conventional rule. The Italian architect, if he had only to support a trellis-work of wood for the training of his vines, and thought fit to do so by columns of marble or of stone, proportioned their diameter to their height in exactly the same manner as if they had been intended to support a solid and ponderous pediment. The Gothic workman proportioned the diameter of his column to the weight it had to sustain. As the heavy and solid arch of the earlier builders became lightened by recessing, and gradually became architecturally divided into separate members, the sustaining pier split into clustered columns. The same structural idea seemed to be present, the law that each superincumbent piece of work must have its own support. If the low heavy arch require the squat pier, each of the many moulded groins and ribs must be supported by its own graceful but appropriate shaft. With the advance of practice, and with some increase of knowledge of the transformed Oriental style of the Saracenic builders, the arches and vaults of our cathedrals became lighter and bolder. The indispensable shaft would interfere with some other feature or requisite of the building if it sprang from the ground. It was made to rise, in such a case, from a light corbel instead. The principle was preserved, though modified in its application. A step further, and the original idea has become so entirely conventionalised that the object for which it was introduced as a canon has entirely disappeared. The shaft clings to the rib, but it is as a weight and not as a support. In the form of a pensile shaft, of a pendant or of a boss, entirely unsupported, it has become at the same time a quaint and effective architectural ornament, and a structural defect. It weakens the arch which it professes to strengthen. Thus, while the rule has been maintained, the reason of the rule has been abandoned, and an architecture founded on the idea of a just and exact proportion of support to superincumbent weight has been gradually transformed into a style that aims at destroying the sense of weight altogether, and suspends over the heads of astonished admirers a rich canopy of stone, soaring high, as if upborne by celestial supporters, and actually weighted and pulled down by bosses and pendants, where it would, in simpler times, have been supported by shafts.

The instances in which we can thus distinctly trace the rise, development, conventionalisation,

and final obliteration of a great idea or leading principle, are extremely rare. Hardly any, if any, branch of human study affords so ready a means of investigating a case of the kind as that which we have pointed out as falling within the province of architectural study. Some of the most curious problems in human history arise from the conventionalized form in which a new idea is first to be detected by the light of the present state of our erudition. The form of the square Hebrew letters is a case in point. They are called Chaldean. They differ from the Phœnician, while there is a close family resemblance between the Samaritan or general character of Palestine, the ancient Greek—the Phœnician of the Jewish coins of the date of the Maccabees,—and very possibly the rudimentary forms of the Sanscrit. From all these the Hebrew letters differ—not only in finish and detail, but in being written the reverse way. But almost every ancient Greek letter presents a distinct resemblance to an *impression of an incised Hebrew letter* of corresponding value. The literal hieroglyphics throw no light on the subject. The most learned and approved theory is, that the square Hebrew letters were those used by the Chaldean men of learning, and that they were brought back from Babylon by Ezra, who is generally made to stand godfather for the whole Jewish literature of a date preceding his own. Unfortunately we have, since this theory became orthodox, found out what letters the Chaldean scribes *did* use, what letters were in use in Mesopotamia from the days of Abraham to those of Nabonadius. And these letters present no resemblance whatever to the square Hebrew character, which thus remains an instance of a set of signs first known to human history in a full-grown state of maturity, as to the origin of which we have no light whatever.

Heraldry is another case in point. According to all the theoretic explanations of the origin of heraldry, charges, as the heralds call them, lions, eagles, representations of natural objects, should have been the earliest bearings. Those familiar with genealogical study know that the contrary is the case. In Continental heraldry charges seem mostly to have been originally borne as differences. Where they are known to have been augmentations, they date later than the original bearings. The sixteen eaglets of Montmorenci were four at an earlier period. The ancestors of the "*premier Chrétien*," who assumed the four birds at a date heraldically determined, bore the plain red cross. Again, in the arms of Lorraine, the first bearing of the House of Austria, the three alerions are attributed to the time of the Crusades. The bend claims a higher antiquity. The honourable ordinaries are older than the charges; or, in other words, heraldry, when first known to history, was as thoroughly conventionalised as it is at the present day. The pale may denote the lance, the bend the scarf, the fess the belt, the chevron the saddle; but we have not the smallest certain knowledge of the manner in which a broad line across a certain part of the escutcheon came to have such an import. Heraldry comes into history full grown, as Minerva sprang into the midst of the gods.

This view of a great capability of historic architecture should stimulate the exertion of those of the professors of that noble art who have time as well as knowledge at their command. It is only necessary for such men to bring to bear on this novel branch of their study the patient and untiring energy by which the philologists have lately won such brilliant triumphs, to take place by the side of the latter discoveries with no secondary lustre.

SOUTH KENSINGTON MUSEUM.

SOME eleven or twelve thousand persons are visiting the museum weekly just now, instead of the ordinary average of about ten thousand, chiefly on account, we suppose, of the loans and purchases from the recent Paris Exhibition. These are exceedingly interesting, and will give pleasure and advantage to all who rightly examine them. The inlaid and carved cabinet of various woods, manufactured by M. Fourdinois, of Paris, was purchased, and rightly, as the piece of furniture of highest class exhibited. This cabinet extorted the admiration of the English artisans who have reported to the Society of Arts. The carving, says one of them, is "not planted on, but inlaid, the wood being quite cut through, and, when all glued together, it forms one solid mass. This piece of work I consider to be the perfection of cabinet work." If we understand it rightly, the carving is cut in as marquetrie, allowed to project as required, and afterwards carefully modelled and worked down to the ground, the inside being afterwards veneered. Where the carving is put upon thick pieces, it is let in with chisel and gouge about 3-8ths of an inch. Another of the reporters, while expressing great praise of this cabinet, gives the palm to Messrs. Jackson & Graham's exquisitely made ebony and ivory cabinet, of which we spoke with great admiration, even before it was sent to Paris. The French cabinet, however, involves art of a much higher order, in the shape of sculpture, and must be placed first. The majority of the figures and all the heads are admirable and beautiful in the highest degree; the general tone of colour, too, is exceedingly agreeable, and the whole is a delight. The authorities have wisely inclosed it in a glass case, to protect it from soot and dust, not to be avoided, especially in a glass-covered building.

We should like to see the same care immediately bestowed on the truly lovely ebony and ivory pavilion-cabinet from Italy, which has been lent by its makers, the Signori Alessandri. Unless this be covered, our terrible dust and smut will ruin its pure fresh beauty. Being entrusted to us, it would be discreditable if we allowed any damage that could be guarded against to befall it. Some of the groups are exquisitely carved.

The spinet of pear-tree wood, carved, and encrusted with ebony, ivory, lapis lazuli, and other rare materials, should not be overlooked by those who are technically interested in cabinet-work and its connexions. The centre-piece for a table and large ewer, in Rock Crystal, from the Imperial treasury, Vienna, are more remarkable than beautiful. These were executed in the seventeenth century for the emperor Rudolph II., and are lent by the present Emperor of Austria. The term "crystal" has been so bandied about, from cups and chandeliers to palaces, that it was not surprising to us to hear a man of position and education describing these articles as "of a peculiar kind of glass;"—glass, certainly, but having Nature for its maker. Rock crystal is a transparent variety of quartz.

The collection of cheap gold-work and jewelry as worn now by the Italian peasantry, is suggestive, but should scarcely be laid out "as examples for art-workmen," without cautionary remark. The great curiosity of the new acquisitions, however, is what is termed the "Treasure of Petrossa," a collection of ornamental objects in solid gold, found by peasants near Petrossa, in Roumania, in the year 1837. The inscription upon them says they were probably manufactured by the Gothic tribes of Dacia, from 400 to 500 years after Christ. In one of the pieces (if not in others), a circular dish, with a sitting statuette rising from the centre, Byzantine influence is visible. Without assenting wholly to the date ascribed, these works are very early and very remarkable; and what a story they suggest! Dacia, the land of the Getæ, was the last of the Roman conquests in Europe. This was effected by Trajan, A.D. 104, and the chief events of the campaign are shown on Trajan's Column in Rome. A lump of masonry on each side of the Danube, near the village of Scala Gladova, shows where stood the enormous bridge built by Trajan. The Romans ceased to be masters in the year 275, and left Dacia to the Goths. After the death of Attila came varied rulers, and then it fell to Charlemagne. The Dacian tribes supplied the Roman circus. Every one will remember Byron's reference when describing the fall of a gladiator in the Colosseum:—

> "He reck'd not of the life he lost, nor prize—
> But where his rude hut by the Danube lay,
> *There* were his young barbarians all at play,
> *There* was their Dacian mother,—he, their sire,
> Butcher'd to make a Roman holiday—
> All this rush'd with his blood.—Shall he expire,
> And unavenged? Arise! ye Goths, and glut your ire!"
> *Childe Harold*, stanza cxli.

A good account of this Treasure of Petrossa, and the circumstances attending the find, would be interesting.

IMPROVEMENT OF DWELLINGS IN BELGIUM.—A joint-stock company for the erection of working men's dwellings has just been founded in Brussels, under the patronage of the Belgian Immobilière. The King has taken a hundred shares of 500 f. each, and the Count de Flandre fifty. The capital is to be 5,000,000 f.

PROFESSOR G. G. SCOTT ON EARLY ARCHITECTURE IN GREAT BRITAIN.*

HAVING now given a general outline of the intrinsic principles of Norman architecture, I will proceed to offer a few brief descriptions of some of its earlier creations, or rather of a selection of such of them as have come down to our own day, or of which we have sufficient information to make the consideration of them profitable.

I have already spoken at some length of Lanfranc's Cathedral, at Canterbury, and of its identity, in general design, with the Conqueror's Abbey Church of St. Étienne, at Caen. I shall have to revert to this cathedral more than once in describing additions and alterations of later date; but there are no remains of Lanfranc's original work of sufficient importance to warrant me in occupying your time upon it.

I have also alluded to the chapel in the Tower of London: of this most perfect and typical example of the very early Norman, I exhibit some illustrations. Severely plain, as befitted the chapel of a fortress, it is, nevertheless, as complete and as well designed a building as could well be produced. Apsidal with continuous aisles, in two stories, and vaulted throughout the central space and the upper aisle by unribbed wagon vaults, becoming in the former case semi-domical on reaching the apse, and the lower aisle groined, it is more perfect in ideal than the choir of any English or Norman church that I am acquainted with of its period, and is parallel in this respect with the great churches of Auvergne, only needing the clearstory to render it a complete type; a model of a perfect choir, with an entire absence (excepting in the capitals of the columns) of ornamental detail. Several of these capitals are like those which prevail in St. Étienne at Caen, and which appear in Remigius's work at Lincoln: they are a dim reminiscence of the Corinthian capital, with a cross-formed block representing the rosette in the abacus; for, be it always remembered, that the abacus of a Corinthian capital was not the prototype of that of a Romanesque one, in which a substantial impost is superimposed upon the delicate abacus of the classic column. I give drawings from Caen, from the Tower, and from Lincoln, to explain the identity and peculiar characteristics of these capitals. The common cushion capital is also freely used.

I will next go to St. Alban's: not that I can distinctly assert it to be the next in date; but because it stood first in rank among abbeys, as Canterbury among cathedrals; because it was built by the friend and companion of Lanfranc; and because the crudeness of its material, by divesting it of all decorative features, renders it a more purely typical and elementary example than any other we possess.

Founded only ten years after the Dioclesian persecution, when St. Alban became the protomartyr of Britain,—destroyed during the invasions of Pagan Saxons, and refounded as an abbey during the last years of the eighth century by Offa, king of Mercia,—the church of St. Alban had become famous throughout Chistendom.

The two last Anglo-Saxon abbots having determined on its reconstruction, had incurred great labour in excavating among the ruins of the adjacent Roman city of Verulam to procure materials for the work; but a dreadful famine, followed by the Norman invasion, had prevented the realization of their intentions.

In the year 1077, Paul, a monk of St. Stephen's, at Caen, and a relative of Lanfranc, was appointed to the abbacy; and, during the first eleven years of his tenure of office, he had "constructed the entire church" "of the stones and tiles from the ancient city of Verulam." I presume, however, that this statement of Matthew Paris must be taken with some abatement, as we do not find the dedication to have taken place till 1115.

The church thus erected, though homely in material and of simple workmanship, was stupendous in its scale and prodigiously massive in its construction.

It is curious that, while the Abbot of St. Stephen's, when made Metropolitan of all England, was content to copy his abbey church for his metropolitan cathedral, a plain monk of the same monastery, when made head of the first

* Lecture III. at Royal Academy, February See pp. 70, 90, 108, and 127, *ante*.

English abbey, should go so far beyond his former church in the scale of his new one.

A glance at the two plans will show the extent of the difference. While at St. Stephen's the nave (including the façade) has nine bays, that of St. Alban's has thirteen; while each transept of the former church had two bays and one apsidal chapel, those of the latter had each three bays and two chapels; and, while the choir at Caen had only two bays besides the apse, that at St. Alban's had four.

The western façade, too, differed in that while that at Caen had towers which closed in the ends of the aisles, those at St. Alban's projected wholly beyond their side walls; thus increasing the width of the front by double that of the aisles. The effect of all these changes upon the dimensions of the buildings was that, while St. Stephen's was only 300 ft. long, St. Alban's was 465; that, while the transept of the former measured 140 ft. in length, that at St. Alban's was 210 ft.; and that the widths of the two western façades were respectively 88 ft. and 155 ft.

The design, though of the most rigid and almost gaunt simplicity, was admirably proportioned; and, when compared with Norman churches of more kindly material, seems like the block model rather than the finished structure. The cause of this was the use, almost to the entire exclusion of finer material, of the Roman tiles from Verulam. With these, not only a great part of the mass of the walls, but the pillars, arches, windows, string-courses, and other parts usually formed of stone, are almost exclusively constructed.

One might fancy that a vast structure erected of such materials, might have a very picturesque appearance, and that the rich and deep red of the brick, alternating with an equal quantity of coarse mortar in the joints, and interspersed with rough flint work, might give to the general colouring of the edifice a warmth of tone, and a richness of texture which, on a general view, might more than make up for its ascetic plainness. But, oh! tell it not in our Belgravian Gath; neither publish it in the streets of our Tyburnian Ascalon! These Norman builders, like too many of their descendants in our own day, had no such artistic notions, but rejoiced in encrusting the whole,—within and without,—with one uniform coating of the smoothest and whitest plaster! St. Alban's, when viewed from the ruins of Old Verulam, must have looked like a sort of "Moel Wynn,"—*a white mountain*; or, like the creation of a spell of Merlin,—hewn out of a single block of marble! Our romantic old Mediævals were not proof against such fascinations, for we found St. Wilfred glorying in having washed the York Minster of his day, "whiter than snow;" and at Peterborough, it was the boast of one of the abbots, that he had so skilfully whitewashed his cathedral, that it appeared as if cut out of a single stone! But let us take comfort. Abbot Paul had not sunk to so low a depth! He had an eye to the sister arts; and we find him recorded as having enriched with painting the vaulting of the apse behind the high altar. Nor did he stand alone in his taste for such decorations; for we find now that every part of the plain old plastered walls, pillars, arches, and vaulting has been so enriched at different periods, the western side of the great piers of the nave being richly painted with figures and subjects as the reredoses of the altars placed against them.

With such artistic relief as this, added to the stern and massive grandeur of its parts and the stupendous scale of the whole, and adding also the gorgeousness of the shrine of the Protomartyr, and of the numerous altars and other objects which imparted beauty and solemnity, one may well imagine that the internal effect, notwithstanding the absence of architectural detail, was as noble as it must have been unique.

The roofs, internally, may be proved to have been marked by level ceilings, no doubt gorgeously painted like that which still remains over the contemporary church at Hildesheim in North Germany, or that but recently executed by Mr. Burges, aided by the charming art of Mr. Poynter, over the nave of Waltham Abbey. The present painted ceilings are, no doubt, the lineal successors of the Norman ones.

In the midst rose the stupendous piers and arches which sustained the tower, between which the open lantern soared high above the church, while beneath this lofty centre of the stupendous cross were ranged the stalls of the monastic choir.

I illustrate this wonderfully dignified and impressive structure by several drawings of the whole and of parts. It will be seen from this how simply and almost exclusively it trusts to the most elementary principles for its architectural effect. First, to its general grouping and proportions, which are a perfect model of a typical Norman church, bereft of its usual details; and, secondly, to the simple principle of divided orders, which I have before explained, but used in nearly all instances without the aid of decorative shafts of mouldings.

The proportions of the internal elevation are such that, if the entire height of the wall be divided into nine parts, four go to the main arcade, two to the triforium or gallery, and three to the clearstory.

The arches of each are of three orders, and are, for the most part, without shafts; the section of the jamb and arch being the same, severed only by a simple impost. A broad pilaster buttress runs up the face of each pier from floor to ceiling.

In the transept, however, the triforium is differently designed, being sub-divided into coupled arches, and supported by stone shafts. Many of these shafts are balusters (most likely of Offa's church) made use of again, with the addition of a Norman capital and base, and sometimes eked out in length by the interposition of Roman tiles. Like the balusters I have had the opportunity of examining at Dover and at Jarrow, they bear evident marks of having been turned in a lathe.

The outer wall of the gallery story has been removed, but of its former existence there is distinct evidence; the mark of the roof, as seen against the transepts, showing that the walls have been lowered by some 8 ft. or 9 ft. Only three bays of the aisles retain their vaulting, which is of the most typical form of groining. It is capable of almost certain proof that the roofs were throughout devoid of parapets. The transept fronts were divided up the middle by a wide pilaster buttress, and flanked by similar ones. Their windows, as nearly all others, are of the greatest simplicity; three recessed orders in jambs and arches alike, with imposts to the two outer ones: above the springing line, however, of the gables, were ranges of double windows divided by stone shafts. Each transept has a staircase in its western angle which runs up into an ornamental round turret, with four double windows in its upper stage, and was most likely crowned with a cone. These staircases led into the triforium passages and into the roof.

The tower has three stages above the ridges of the roofs. The lower one has plain windows lighting the lantern; the second has, on each side, two pairs of double windows; and the upper story has two such windows of large scale. The tower is flanked with pilaster buttresses merging in the upper story into round turrets.

I will next take Winchester Cathedral. York would have claimed precedence as a metropolitan church, but its Norman remains are so small in extent as to neutralize its claims. I may mention, however, that Professor Willis (whose marvellous perception of antiquarian evidence enables him to describe, almost with precision, buildings of which the common observer would conclude that no relic or evidence exists) has shown us that the Norman cathedral at York (begun soon after 1070) was a structure of prodigious magnitude, and exceeded in the width of its nave any church in England; measuring 50 ft. from centre to centre of its piers.

Winchester may be said, in these early days, to have rivalled London as the capital of England; for it had been the capital of that Saxon kingdom which brought all the others into subjection, and whose kings became kings of England; while London — the capital only of Essex, a kingdom subordinate to Kent—owed its greatness simply to its river.

We have already seen that the cathedral, founded by Birinus in the seventh century, had been rebuilt by Athelwold and Elphege in the tenth century.

Bishop Walkelyn, a chaplain and relation of the Conqueror, about 1079, began to rebuild it, and finished his work about 1093.

Walkelyn's Cathedral exceeded in vastness even Abbot Paul's stupendous work at St. Alban's, Its nave was of eleven bays, besides two vast western towers. Its transepts each had four bays; its eastern arm four bays, besides the apse, which had a surrounding aisle, and was flanked with two small towers.

Its length, independently of an eastern chapel, was 485 ft.; or, including this chapel, 530 ft. The length of its transept was 225 ft. (it was double aisled, that at St. Alban's being unaisled), dimensions which exceed those of St. Alban's, and leave those of Lanfranc's metropolitan church far in the background. The width, too, of the nave and its aisles was greater than that of St. Alban's.

The architecture of this vast temple was of stern simplicity, though, being carried out in stone, it was much more fully developed than that of St. Alban's. It was, in fact, a full and typical development of the Early Norman, with every feature complete, though all in their plainest garb.

All which now remains of this date is the transepts and the crypt of the eastern arm, and they may be described as the text-book of Norman in its earlier form. The transepts, as before-stated, were doubly aisled, and (as at Canterbury and at Caen) a gallery crossed the outer bay of each, supported on a massive round pillar, so as to render the upper aisle continuous.

The plan of the piers of the transept, which probably gives us also that of the rest of the church, is very perfect and typical.

Their figure may be generated by the process I have described in my last lecture. Take a block of wall about half as long again as its thickness; cut out from each of its angles the recess of an order; substitute half or three-quarter shafts for the part which supports each order; and the pier proper is complete. It still needs, however, supports for the vaulting of the aisle on the one side, and for the central roof on the other. The former is given by adding to that side a pilaster of equal size with the transverse rib of the vaulting, and substituting for its front portion a demi-shaft; the latter by a similar projection with the addition of two smaller shafts on its flanks. Nothing could be more perfect or more typical than this arrangement. The capitals are everywhere of the cushion type, in its simpler form. The arch-orders square, and without labels. The entire height of the wall being divided into three, the upper, or clearstory, may be said to occupy one-third; the remainder being divided between the great arcade and that of the gallery or upper aisle in the proportions of about four and three.

The gallery, or triforium pier, is similar in plan to that below, but the arch is divided into two widths, in the sub-order, by a central shaft bearing two smaller arches. The clearstory, in its more typical bay, is divided into three widths by small shafts, the side spaces being low arches, and the central one being considerably elevated, and containing the window.

Through this story passes the passage through the thickness of the wall, which ought more properly to be called the triforium.

The transept elevation is divided vertically into two compartments by a large pilaster buttress, both without and within, and is externally flanked by similar buttresses. In height it is divided into three stories, ranging with those of the interior, already described, the aisles naturally containing two of these stories; the upper of which has small windows in the sides, and large ones in the gables. The windows are (as a rule) shafted singly, without and within, with a deep splayed jamb filling the interval. Those of the upper story of transepts fronts are arranged internally to correspond with the clearstory. The gable of the south transept is enriched with intersecting arcades.

Unfortunately, the central tower, of the Early period, fell shortly after its erection, rebelling, as it was thought, against the ungrateful task of overshadowing the body of the detested Rufus.

This untoward behaviour has had the effect of rendering the work imperfect; for, had the crossing remained, one could supply the choir and nave with a fair amount of certainty. As it is, we cannot make any imaginary restoration, for the whole of the centre, with the adjoining bays, has been rebuilt in a Later Norman style, influenced by a morbid fear of a second catastrophe, which led to an undue bulkiness in the piers, where better foundations and harder material would have supplied sufficient security. Let us hope that no second Rufus may be buried beneath the shadow of our precious monuments of art-history! The tower, however, as rebuilt, is a noble work, though of small height. That such stumpiness of proportion was not viewed as essential to the style, we have practical proofs at St. Alban's, Tewkesbury, and Norwich; so we may safely conclude that, like the needless bulk of the renewed piers, it was the result of the

fear that their tower would again refuse to canopy the red-haired king, who still lay in the midst of the church, though removed a few feet from being under the tower.

The crypt, which gives us the form of the original sanctuary and eastern chapel, is a fine example of the Early Norman where used for simple purposes. The columns bear some resemblance to those of King Edward's work at Westminster, though much lighter. Their proportions, however, cannot be seen, owing to their being buried deep in earth, which is, I am sorry to say, not the only barbarism for which the chapter there are responsible.

The nave, as is so well known, was converted into another style by Wykham and his predecessor, Eddington; the last-named of whom must, I suppose, have destroyed the two western towers, if ever they had been carried up. We know them only by their foundations.

In the same county are the two noble minsters of Christchurch and Romsey, the former of which I will mention presently; meanwhile I will carry you in thought to Ely, where Walldyn's brother, Abbot Symeon, undertook, a little later and in his extreme old age, the reconstruction of his abbey church on a vast scale. The parts built or commenced building by Symeon were the eastern arm, the transepts, the central tower, and probably a bay of the nave; for, be it remembered, the eastern arm was, not in those days, as afterwards became customary, the choir, but rather the sanctuary, or, more correctly, the sanctuary and presbytery conjoined. The choir,—that is to say, the stalls for the monks or canons who sat in choir,—was under the central tower, and often ran a little into what we call the nave. It resulted from this that, in cases where funds did not permit the completion at first of the entire building, it was customary to build from the east end up to the second or third pillar of the nave, so as to provide for the actual requirements, and also to give an abutment to the central tower.

Abbot Symeon's plan was formed on the largest scale. His transepts had each four bays in length, and, like those of his brother's church at Winchester, were aisled on both sides. He also built the gallery across the transept, as at Canterbury and at Winchester. His eastern arm was of four full bays, added to which was a smaller bay and an unaisled apse. The aisles of the eastern arm were square-ended. The pillars of the transept were generally round, though in some cases clustered, and their capitals were totally different from those used by his brother, being a quaint reminiscence of the Corinthian.

The proportions of the interior, in point of height, differ from those of Winchester; and it would seem, that the height being divided into three, one was here given to the gallery or triforium, the remainder being divided between the great arcade and the clearstory, with proportions of 4 to 3; so that the main arcade retaining the same proportion as at Winchester, there is more triforium and less clearstory, differences which were increased in building the nave.

The galleries originally built across the ends of the transept were removed during later, though still Norman, times; and an arcade of slight projection substituted. The clearstory differs from Winchester in the arches of the three openings springing at equal height, and the plans of the piers differ considerably. Those in the transepts (as before said) are round and clustered, the latter consisting of the customary group of three shafts on its lateral faces, with a single shaft at back and front, for the vaulting and the roof, making together a perfectly uniform group of four larger and four smaller shafts. The round columns have a shafted pilaster attached to them on the side facing the aisle.

The nave piers are of alternating forms. The one is founded on the circular column, but has, not only the shafted pilaster at the back, as those in the transepts, but two shafts, to carry an extra arch order, in front, and a group of three running up to the roof. The other form of pier is like that at Winchester, with the addition of an extra order, and has the triple shaft running up to the roof, as that last described.

The triforium piers are very similar, though lighter, excepting that the round pillar has lateral shafts to carry the subarcuation. All the orders are moulded.

How far the general plan was laid down from the first by Symeon is not known, but it differs from other cathedral and abbey churches in having a magnificent transept at the west end. Whether what we call the foundations of towers at Winchester may have been a foreshadowing of the arrangement I cannot judge; but from its extraordinary scale (far exceeding that of western towers in general), I think it not unlikely. There was also some distant resemblance to this in the façade at Bury. Though, judging from the number of its bays, one would think the size of Ely and Winchester not very different, there is a disparity in the essential scale, which causes it to fall far short of the dimensions of Walkelyn's church. The widths of naves from centre to centre of piers are respectively, 42 ft. 6 in. and 37 ft. 6 in.; and that of the bays, similarly measured, are about 22 ft. and 19 ft. 9 in.

The nave is of thirteen bays, besides the western transept. These parts were added in the course of the twelfth century, making the whole length (not measuring the west porch added in another style), about 420 ft., the transept measuring about 190 ft. in length.

There was, of course, a central tower as usual, but there was a second tower of great size, and probably of greater height in the middle of the western transept, which transept was flanked at its angles, with vast polygonal stair turrets, and had large and noble apsidal chapels projecting from its eastern sides. These parts are in the transitional style, which I do not touch upon during this session; but I may here say that, whether projected from the first or not, a more magnificent addition to the usual features of a great cathedral or abbey church, can hardly be imagined, though what its effect was when the central tower existed, and the western one was crowned by a vast leaded spire, one can hardly now appreciate.

Abbot Symeon's tower had the same radical weakness with that built by his brother, and though it lasted longer (having no Rufus beneath it) it at length gave way, and was succeeded by the remarkable structure now forming the unique centre of the glorious temple. The transept and elevations are not unlike those at Winchester in general distribution of parts.

Of doorways, windows, &c., I will not now treat, though some of the latter are of great beauty. Were it not that I limit myself during the present lecture to buildings begun during the eleventh century, I should here have noticed Peterborough, whose eastern end was a manifest imitation of that of Abbot Symeon. I exhibit some excellent illustrations of the architecture of that magnificent church, but must reserve my description of it for another lecture.

Abbot Symeon died at a hundred years of age in 1093. Of what a long course of events had he been a contemporary or an eye-witness! He might have remembered the congratulations called forth by the failure of the prognostications of the world's ending in the year 1000. A relative of the ducal family of Normandy, he might have witnessed, when in early manhood, the arrival of Ethelred and Emma with the destined king, confessor, and saint, when they fled from the ravages of King Swayn; and he might have even directed the education of the Confessor-King. In architecture, he might have watched almost from its rise the development of the Norman style, and have assisted, when at early middle age, at the consecration of Duchess Judith's Abbey Church at Bernay, which is now our earliest specimen of what was then the rising art of Normandy, and long subsequently became that of England, and of which he and his brother,—now in their old age,—had become respectively the founders of two of the noblest examples.*

* To be continued.

COMPARATIVE ALTITUDES.

I BEG leave to supplement the article on comparative altitudes, by drawing attention to some places that have escaped the notice of "A. J.," and which, with some additions, I will endeavour to make by running up the levels along the different lines of railways and canals, we may arrive at the comparative altitudes of the principal places in the country; and if, perhaps, from untoward circumstances, I am unable to complete the series, perhaps some of your scientific readers will render us aid, so that your journal may possess a complete record of the altitudes of the cities, towns, &c., throughout the country.

Should we succeed in obtaining this information, on correct and trustworthy data, it is to be hoped that the surveyors of the different towns will make the addition to the sections of the towns by adding the sea level as a common datum, where sections exist, as in several cases that have come under notice it has been found that the inclination is only marked on the plans, and sections are altogether dispensed with. This is one of the serious innovations introduced by the staff of the late General Board of Health.

I have carefully looked through the reports of the general Board of Health for the year 1849 and subsequent years, and find no allusion made, except in one instance in the report on Penrith, to the subject of the altitudes of towns, although that must be matter worthy of consideration, and must exercise a marked effect on the public health, as it seems to regulate the state of the atmosphere, the hygrometric condition of the air, the rainfall, and other meteoric causes; and it would be a subject of curious and interesting inquiry to make a careful analysis of the death-rate in our towns, looking more particularly at their physical site and their comparative altitudes. On the subject of altitude and climate, an eminent medical authority observes, there are three degrees of altitude in eminences to be considered, namely, the moderate mound, the high hill, and the lofty mountain: the mound is a small eminence, while the hills in England rise to varied heights. According to their heights so the air differs in degree of temperature, which is readily ascertained by a barometer.

But we have no instrument to ascertain in what degree one air differs from another in medical quality, since the composition of the atmosphere appears to be merely the same on all parts of the earth and ocean; but we know from observation that there are great differences in the air as well as climate, as far as the effects on the human frame are concerned. When the hill is of moderate height, lying open to the south, and backed by others in the form of a crescent, such a spot would be pronounced salubrious and bracing: when it is lofty, open, and exposed, such a situation would be severely felt, and on the tops of the mountains it would be insupportable, arising from the lightness of the atmosphere.

The objections to climates in valleys are,—they produce many complaints when shut in with high ridges of barren sides, the cold draughts and the reflected heat of the sun produce a variety of diseases, the high ridges prevent free circulation, and the hot sun beats down and creates a complete focus of heat, and extracts from vegetation and humidity a prodigious amount of malaria.

The place is not open to those objections where the ground gradually slopes to the south, with a gravelly substratum. There the climate is thoroughly beautiful; but when it is low and flat, and on a clayey subsoil, it is then objectionable and unhealthy.

But this is subject matter, I fear, that has not been sufficiently considered by us, nor dreamt of in our philosophy in the consideration of, and in the selection of the sites for, our cities and towns; and we are now many of us paying the penalties this ignorance and want of foresight has entailed, as just now in the middle of the nineteenth century we are endeavouring to remedy gross sanitary abuses, that are rendered difficult, if not almost impossible, by the injudicious sites and physical climates selected for our towns.

> "To build, to plant, whatever you intend,
> To rear the column, or the arch to bend,
> To swell the terrace, or to sink the grot,
> In all let Nature never be forgot."

I beg to add a few additional altitudes I have obtained, and hope shortly to send you others procured from the ordinates and levels of our railways and canals:—

Boston	30	ft. above sea level.
Gosport	30	,,
Plymouth	30	,,
Chiswick	25	,,
Tottenham	50	,,
Penzance	40	,,
Whitehaven	90	,,
Chipping Wycombe	150	,,
Swansea (summit)	150	,,
Wellingborough	160	,,
Grasmere	180	,,
Keswick	258	,,
Swaffham (summit)	300	,,
Bury	300	,,
Hungerford (Berks)	320	,,
Hyde	320	,,
Fairfield	320	,,
Bolton	320	,,
Do. Belmont Reservoir	850	,,
Rochdale	500	,,
Marples	531	,,
Lanark (Scotland)	600	,,
Chapel-en-le-Frith	1121	,,

B. B.

Acknowledging with thanks your aid in launching this subject, and gratified by the remarks educed, I wish to explain the "somewhat ambiguous term" alluded to. "The mean level of the sea at Liverpool," to which my figures all refer as a commom *datum level*, is a plane as nearly as possible 10 ft. *below high* water-mark, and 10 ft. *above low* water-mark. If, therefore, "B. B." will *add* 10 ft., he will find that his figures and mine very nearly agree. For comparative altitudes it matters not what datum level be adopted, if that one be adhered to. The figures I have given before, and now append, will probably incite some *in statû pupillari* to level across to other points, and thus information may be extended beneficially. It has always seemed to me that several considerations are involved in this question of altitudes, and I hope to treat the subject comprehensively very soon. Meanwhile I shall be glad to see facts, figures, and opinions from correspondents. The statistics which accompany this letter, grouped as before, show at a glance the undulating features of this island, which is called flat. Certainly it is unlike Abyssinia, where our troops have had to mount 9,000 ft. before they really entered the country; but probably very few who have read her Majesty's book know that Balmoral Castle stands 900 ft. above Buckingham Palace. A. J.

Bridgwater	Trinity Chh.	25
	Market House	38
Doncaster	Grand Stand	35
	St. George's Chh.	48
Howden	Market Cross	18
	Chh.	21
Ilfracombe	Broad-street	22
	Road, nine miles from Barnstaple	604
Newcastle-upon-Tyne..	Milk Market	25
	Blenheim-street	154
Plymouth	Octagon	6
	Royal Hotel	32
Selby	Chh.	22
	Market Cross	23
Stirling	Bridge	35
	Union Hotel	66
Taunton	St. Mary Magdalene Chh.	60
	Market House	62
Tewkesbury	Market House	44
	Abbey Chh.	46
Truro	Bridge	14
	St. Mary's Chh.	19
Tunbridge	Town-hall	84
	Grammar School	104
Warrington	Butter Market	25
	St. Paul's Chh.	48
Axminster	Market House	131
	St. Mary's Chh.	136
Droitwich	Bridge	102
	St. Peter's Chh.	171
Godalming	Chh.	138
	Town-hall	149
Oundle	Market House	103
	Chh.	111
Thrapstone	Market-place	101
	Chh.	110
Wilton	Bridge	178
	Chh.	181
Virginia Water	School	135
	Christ Chh.	147
Bromsgrove	Bridge	262
	Market House	280
Dorchester	Chh.	222
	Barracks	249
Edinburgh	St. George's Chh.	218
	Music-hall	225
Sheffield	Fruit Market	205
	St. Peter's Chh.	257
Tavistock	Market-place	267
	Chh.	271
Wellingborough	Town-hall	201
	Chh.	216
Wellington (Som.)	Market House	246
	Chh.	257
Brentwood	Chh.	356
	R.C. Chapel	358
Liskeard	Fish Market	392
	Chh.	444
Luton	Chh.	350
	Town-hall	360
Rugby	Hotel	374
	Chh.	377
Ashby de la Zouch	Ivanhoe-lane	403
	Chh.	432
Macclesfield	Palace Inn	472
	St. Michael's Chh.	498
Mauchline	Chh.	467
	Toll-house	478
Newcastle-under-Lyme	St. Giles's Chh.	410
	Town-hall	422
Sanquhar	Town-hall	467
	Chh.	479
Wootton Basset	Town-hall	419
	Chh.	421
Chipping Norton	Chh.	567
	Town-hall	645
Glossop	Bridge	548
	Chh.	565
Selkirk	Town-hall	560
	Main street	562
Sevenoaks	Chh.	506
	White Hart Inn	618
Oldham	Townhall	674
	St. Mary's Chh.	702
Bowes Chh.		971
Llanbister Chh.		981
Glenshee Chh.		1,120
Balmoral Castle		924
Braemar Castle		1,075
Lluest Farmhouse		1,455
Lord Fife's Hunting Lodge		1,513
On Glossop-road, nineteen miles from Sheffield		1,666

EXCAVATIONS ON THE PALATINE.

Before the commencement of the works on the Palatine Hill, 4th November, 1861, in that Farnese estate purchased from the ex-King of Naples by the Emperor of the French, at the price of 18,000*l.* sterling, little of systematic or persistent effort had been dedicated to the search after antiquities on that classic site. It appears that the buildings here served for the last time as a royal residence A.D. 500, during the brief stay of the Ostrogoth Theodoric in Rome; but it is supposed that, till so late as the twelfth century, the newly-crowned German emperors used, in some instances at least, to hold their state banquet, after the coronation ceremony at St. Peter's, in these decaying halls. The general conclusion is that, from some period within the eighth century, the aggregate of these imperial edifices was abandoned to the natural process of decay, already, no doubt, despoiled of its portable treasures in the invasions of northern barbarians; but, as we may affirm with like certainty, exposed to much greater injury, affecting all that remained in ancient architecture, at all serviceable, from the deliberate and cold-blooded spoliations by Roman citizens, the turbulent baronial families, and perhaps, also, some of the Popes, alike unscrupulous, within Mediæval periods. It was about the year 1536 that Paul III. founded the villa, with extensive gardens and a summer residence called, after his family, "Orti Farnesiani," for which Vignola, Sangallo, and Buonarotti were engaged to make designs, and in which that pontiff accumulated great store of artistic wealth, sculptures from the Antonine thermæ, and from other classic ruins; a museum, all whose contents were finally transported to Naples after the Farnese line had become extinct, and its property been inherited by the Bourbon dynasty of the Two Sicilies. The only noticeable works for antiquarian objects carried out on the Palatine by the Farnese owners were those ordered by the Duke of Parma, 1720-28, and described in the "Palazzo de' Cesari," by a learned prelate, Mgr. Bianchini (Verona, 1738), subsequently to which nothing of the kind was attempted on this part of the Imperial Mount, till it had passed into other hands. Adjoining this Farnese estate is the villa, with large gardens, formerly of the Dukes Mattei, but later purchased by an Englishman, Mr. Mills, who built the ugly and conspicuous mansion called after him, and now owned by a community of Visitandine nuns here resident, in consequence of which proprietorship neither house nor grounds can now be visited by the public. According to some learned writers, and inferrible also from the character of the ruins here brought to light, that same Villa Mills occupies the site of the palace of Augustus, built for him by public subscription after the modest mansion of his forefathers had been destroyed. Curious is the story of explorations on that now conventual estate, exemplifying the unsystematic senseless manner, though with some fits of transient zeal, in which such undertakings used to be carried on in Rome. Among other eye-witnesses, Flaminio Vacca tells (in his "Memorie," written 1594), of a gateway with marble jambs, 40 ft. high, a niche lined with African marble, and a colossal head of Jupiter in basalt, found here in his time; that bust having been purchased by himself, and therefore lost to the Roman public. Santi Bartoli tells of diggings made about the middle of the seventeenth century, that led to the discovery of a spacious hall, subterranean, entirely hung with tapestry of woven gold, but which decoration was soon reduced to dust on the admission of the outer air; also another chamber, with walls encrusted with finely-beaten lamine of silver, that seemed to have been ornamented with designs or reliefs, but all which precious material passed into the hands of traders, or into those of a certain cardinal's servant, the first purchaser to present himself! And the same antiquarian writer mentions also the mutilated statues, the fluted columns of *giallo antico*, seen by him among this treasure-trove—all eventually swept away!

The first published plan of the Palatine ruins was drawn up, but far from completely, by Buffalini, about 1550; the next, with more exactness, later in the same century; another, satisfactory in regard to what had hitherto been discovered, by Bianchini, in his above-named "Palazzo de' Cesari;" and lately, we have seen the map of the buildings, with the entire ground, now the area of the works ordered by Napoleon III., prepared with skilful execution by Signor Rosa, director of those works.

To conclude our survey of discoveries on the Palatine in past time. Most important were those due to the undertakings of a French abbé, Rancoureil, 1777, in the Mattei (afterwards Mill's) Villa, reported in the "Monumenti Inediti," v. ii. Behind this mansion were opened, at some depth below the actual level, buildings of such extent and character as to give the idea of a residence truly imperial, in two stories; among the numerous chambers being found four circular, one octagonal, also two curvilinear edifices with fountains in the midst, two atrias with colonnades, three spacious interiors with hemicycles or exedræ, on opposite sides, and with tiers of niches along their lateral walls; three quadrilateral halls, also provided with rows of niches (no doubt for sculpture), a small but richly-ornamented bath-room, six chambers entered from a cavedium, a peristyle communicating with other interiors,—in fact, such a labyrinth of buried magnificence that the explorers might have fancied themselves in an enchanted palace. Beautiful also were the remnants of art in these underground retreats, the fragments of statuary in the circular halls, the stucco ornamentation of vaults, and the paintings, Tritons, Sirens, and flowery patterns on wall-surfaces, besides numerous capitals, friezes, and remains of pavements in precious coloured marbles. Two statues of Leda (the finest of which found its way to England) and the Apollo Saurochthonos were the most precious and best preserved of artistic treasures thus disinterred. The illumination of the lower story by skylights with marble gratings seemed to confirm the notion that that part had from the first been subterranean, and used for refuge from the summer heats. Will it be believed that, though an intelligent ecclesiastic was directing these works, almost the whole aggregate of moveable objects,—capitals, friezes, cornices, pavements in rich materials,—was carted off to be sold to marble-cutters on the Forum? And the French abbé, strange to say, caused the entire upper story of those ruins to be demolished, the greater part of the lower to be again filled with soil (as when first opened), and only three among the principal halls left disencumbered,—these being now accessible to the Visitandine nuns alone. The estate on the north-western slopes of this hill was purchased by the Russian Government; but some years since given back to the Roman, by whose order works were soon afterwards undertaken, and slowly carried on in ensuing years on that ground. Here was laid open, 1847, a considerable extent of walls in enormous square-hewn blocks of lithoid tufa without cement, supporting the declivity like a buttress, and evidently the remnant of fortifications, which, whether or not actually referrible to the city of Romulus, are assuredly the most ancient ruins of this character in Rome; and later were cleared of soil several small chambers, supposed to have been the lodgings of soldiers, with curious *graffiti*, proper names, and sentences in Latin or Greek, scratched on their walls; among these, that extraordinary representation so much noticed at the time, referred by archæologists to the time of Septimius Severus, and since transferred to the Museum of the Collegio Romano, a caricature of the Crucifixion, with a figure standing below in act of saluting, the victim on the cross having an ass's head, and the words rudely traced below, in defective Greek, "Alexamenos worships his God!" With the recent works on this side of the hill should be classed those under the neighbouring church of St. Anastasia, where a large extent of chambers and passages, referrible to different dates, have been opened; most noticeable of all things here found being other portions of fortifying walls in stupendous masonry,—the best preserved, and in every sense most important remnant of the ancient civic defences, no doubt among those of highest antiquity, yet known to explorers. Along the southern and much of the western slopes of the hill extend several gardens and vineyards held by different proprietors, in great part by the English College, till purchased, a few years ago, by the Roman Government, in order to the carrying on of works here also, and in the result of which much that is interesting may now be reported. Within the estate formerly owned by that college rise the noblest and most conspicuous ruins, that so imposingly crown the western hill-side above the road towards the Porta Appia, and are probably the latest among additions to the imperial buildings, due to Septimius Severus, and the last inhabited in Mediæval periods.

Encouraging proofs of awakened interest and enterprise have, at all events, been supplied, with promise of ample reward both to French and Roman undertakings on this classic mount, beyond what could be foreseen in the days when Göethe roamed at large over solitary kitchen-gardens planted with artichokes, helping himself *ad libitum* to the precious marbles strewn at his feet on the Palatine in the year 1786.

Rome.

BRITISH ARCHÆOLOGICAL ASSOCIATION.

AT the meeting of the British Archæological Association, on Wednesday evening last, Mr. G. Godwin, V.P., in the chair, Mr. Vanderpant exhibited a bronze urn, said to have been exhumed in the Etrurian Necropolis at Perugia. It consists of a small oblong tomb, containing an urn, and surmounted by a seated female figure. Only one other similar urn is said to be known, and this was in the museum of the Hermitage at St. Petersburg. The urn exhibited was supposed to commemorate Tanaquilla, wife of Tarquin, the fifth king of Rome. Some doubts were expressed as to the genuineness of this object. Mr. E. Roberts said some of the letters of the inscription were not Etruscan, and some of the ornamentation did not seem of the time supposed. Doubts as to the composition of the bronze were also expressed; and the discussion was adjourned to the next meeting. Mr. Holt exhibited two fine wood carvings, which had been presented by the carver, Hans Springenklee, to Albert Durer on his fifty-third birthday, 1523, and read a paper upon them. Mr. Cuming exhibited the wedding-ring of Martin Luther, which was adorned with Christian symbols, and engraved within with the names of Martin Luther and Catharine Boven. This ring belongs to Mr. Frederick Gauss, banker, of Vienna, and has been in his family for 250 years. Mr. Irving read a paper on seals of the borough of Lanark, on one of which was a falcon, which he supposed to refer to forest-rights. Mr. Planché thought the bird to be no falcon, but a spread-eagle,—a two-headed eagle, in fact,—which it was now well known had had its origin in the division of arms; being, in truth, the putting together of two similar halves of an eagle. Mr. Grover read an interesting account of the remains of a Roman villa at Chedworth, where he seemed to think there were strong traces of early Christianity. The chairman announced that the Annual Congress would be held at Cirencester, from the 3rd to the 8th of August, and that Lord Bathurst had undertaken to preside.

GLASGOW ARCHITECTURAL SOCIETY.

THE usual monthly meeting of this Society was held on the 17th inst., Mr. Honeyman, president, in the chair. A paper was read by Mr. W. Forest Salmon, architect, "On Roofs and Chimney-heads." He thought it a mistake to regard the cornice as the finish of a building, above which any kind of ugliness might be placed; it would be much more conducive to pleasing picturesqueness and variety if no attempt were made to make street buildings harmonize with those adjoining them. Each building should be treated independently, and the parts above the cornice should bear an important part in the expression of its individuality, and were therefore worthy of most careful study. He alluded more particularly,—1, to the junction of roof and walls; 2, to the roof itself; 3, to chimney-heads; and 4, to the junction of buildings of different heights.

Mr. A. Thomson thought that where it was practicable one design should embrace a number of houses, and that breaking up the sky-line by irregularities was not desirable where it could be avoided. He thought that practically the design was crowned by the cornice, and that any building which was much indebted to its roof for effect could not be of a high style of art.

Mr. Douglas did not agree with Mr. Thomson in this last remark; at the same time, he admitted that in the grandest architectural remains the roof is utterly ignored. In regard to towns in general, and Glasgow in particular, he might say that practically we had no choice, we were so tied down to uniformity by feu contracts and dean of guild court regulations. If a man proposed adding a story to his house he was at once interdicted; and perhaps it was as well, because such varieties could not be indulged in without great risk of making a blow down in our neighbours' vents, and then the chief variety of sky-line would be produced by very picturesque arrangements of chimney-cans!

Mr. Bromhead thought that the cost would be found to be the great difficulty; and in this Mr. Howatt agreed, pointing out that the chief ranges of buildings were got up by speculating builders, without the assistance of any architect; and that the cost was shaved down to the last farthing.

Mr. Kennedy thought that the erection of a blocking or parapet along streets should be made compulsory.

The Chairman remarked that he could not understand Mr. Salmon's remarks as applicable to the streets of a city generally. Obviously there were localities where a picturesque style and treatment was not only admissible but most appropriate; and others] where anything of the kind would be quite out of place. We should study the requirements of each, recognising the propriety of a difference. He thought a striking instance of a total disregard of this, and the result, was to be seen in the business part of the city of London, which has in so great a measure been reconstructed of late years. He could not understand how any man in his senses could design a magnificent Italian palace, with elaborate frieze and bold overhanging cornice, for an insignificant strip of frontage of 25 ft. or 30 ft. in a narrow street.

NORTHERN ARCHITECTURAL ASSOCIATION.

THE annual meeting of the Northern Architectural Association was held on Tuesday, the 18th, in the Old Castle, Newcastle-on-Tyne, Mr. Green, the president, in the chair. The report, read by the secretary (Mr. Thos. Oliver), stated that the number of members amounted to 51. The income of the year had been 13*l.* 10s. 11d., and the expenditure, 9*l.* 8s. 5d., leaving a balance of 4*l.* 2s. 6d. in the hands of the treasurer. The arrears in subscriptions amounted to 25*l.* 15s. 6d.

The secretary said that between 2,000 and 3,000 persons were, through their respective associations, in connexion with the Architectural Alliance, and all of them adopted one uniform scale of charges. Prior to the Alliance adopting that scale every town had its own scale; but now they had uniformity of practice, and did not undersell each other. The Alliance had also taken up the question of having a uniform mode of measuring artificers' work throughout the United Kingdom, but the matter was in abeyance. Another subject which had been considered was the insertion of an arbitration clause into contracts, and of quantities forming part of contracts; but this matter was also in abeyance.

A subscription of 5*l.* 5s. was voted to the Architectural Museum, London.

The president delivered an annual address, and concluded by suggesting the formation of an architectural library, a school for drawing, modelling, and carving—say in connexion with the School of Arts,—the formation of classes for obtaining a complete mastery of the natural sciences and of languages, in order that they might be able to keep ahead of the time.

Mr. F. R. Wilson, of Alnwick, read a paper on "Dangerous Methods of Construction in the North." He said he would not have taken upon himself to point out some important errors in the present modes of construction in use in the building trades, if he had been, as it were, to the manner born; but having had considerable experience in construction in the South, the imperfections in question, more especially the want of extra care to meet climatic conditions, struck him more forcibly than they might otherwise have done. They were bound to protest against the use of any mode of construction that did not fulfil every condition likely to insure stability and prevent casualities. He first referred to a common method of building stone walls, which was fraught with much evil. Leave a builder alone, he would build up the wall hollow within, throwing into the interstices loose rubble as he went on, which should never be done in this climate. Every course should be well grouted together. He found that some North-country builders, in building brick walling, after a few courses, laid their bricks only at the edge of the wall for a height of a foot or more, and filled up the hollow space with loose rubbish; and then, after another course of solid brick-work, would repeat the hollow one. He had been more than once called to an alarm of fire in consequence of the mode of forming boxing for hearths with wood. A crack in the hearthstone, or a widening of the division in it when formed of two stones, admitted of hot ashes falling through on to the timber, till at last it smouldered. Hearthstones should be of one piece, and should always be laid upon brick or stone arches. Chimney-stacks should be made more substantial, and slates should be fastened more securely on roofs. In this humid climate, and with the porosity of all the stones of the North, no external walls, or walls communicating with external walls, should be plastered on the inner side without being stoothed, in order to do away with damp walls. He also advised more attention being paid to gutters and drains. These, he said, were some of the items of construction in every-day use among builders, which militate against the interests of the architect, and which were fraught with danger to the public; and the unfortunate system which had grown up of reducing the cost of everything to its uttermost limit was the moving cause of the defects he had noticed.

FROM SCOTLAND.

Edinburgh.—Mr. Dobie, painter and decorator, offered, some months since, to the journeymen house-painters and decorators of Britain a number of prizes for the best designs for wall decoration. A large number of competitors entered, and their productions have been on view for several weeks, and have attracted much attention in the trade. The drawings were submitted to the following gentlemen, who acted as judges: Messrs. J. Dick Peddie, James Ballantine, John Nisbet, Edinburgh; R. Dow, Perth; and J. B. Bennett, Glasgow. Their decisions were as follow:—

Drawing Room.—1st prize (20 guineas), William Luetjens, Glasgow; 2nd (10 guineas), Alexander Girdwood, Edinburgh; 3rd (5 guineas), Matthew Hislop, Langholm.

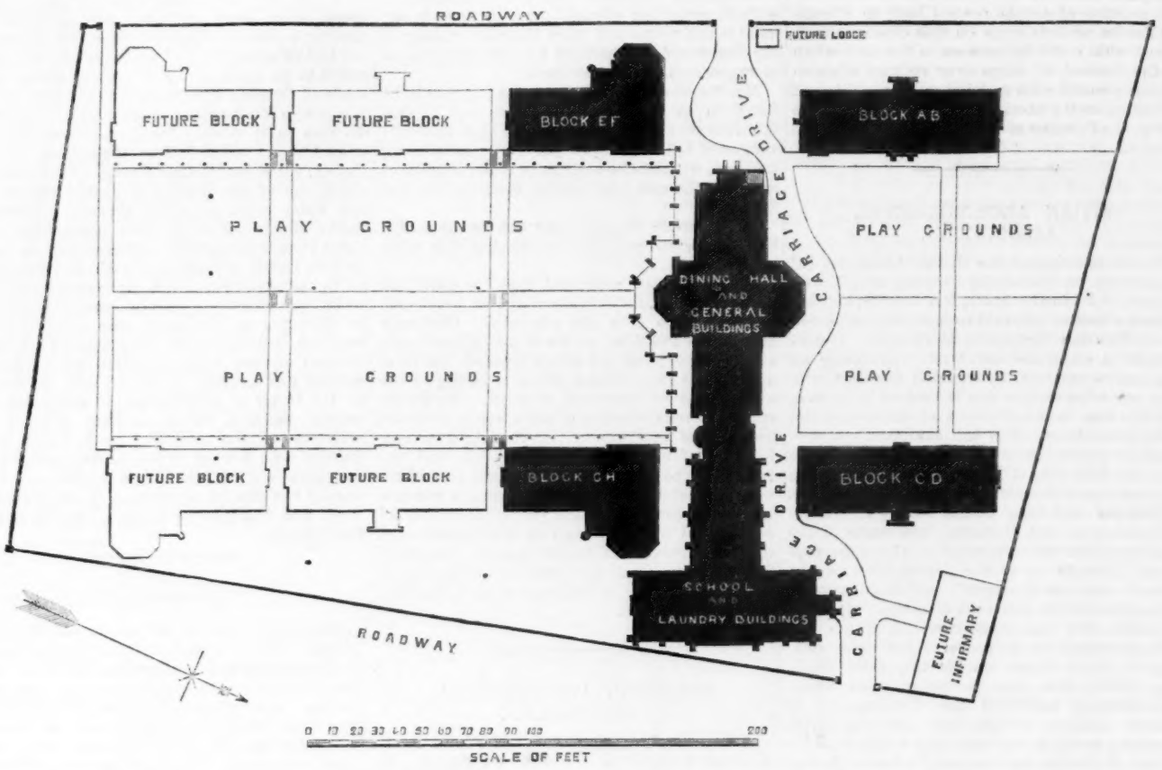
Dining Room.—1st prize (10 guineas, Alexander Girdwood, Edinburgh; 2nd (5 guineas), William Luetjens, Glasgow; 3rd (2½ guineas), Andrew Wells, Glasgow.

——The committee of the Scottish Society of Arts on Technical Education have arranged that a conference shall be held in Edinburgh, on Friday, the 20th of March, and an invitation will be issued to those gentlemen who take an interest in technical education.

Glasgow.—The proposal, which originated in the town council some months ago, to open the new galleries in the Corporation Buildings with an exhibition of portraits of worthy citizens and distinguished countrymen, now deceased, has been successfully carried out. The walls of the five new rooms and galleries are nearly all occupied by the paintings. There are 392 pictures in oil, 26 in water-colours, 15 in crayons, and 26 busts or medallions, executed principally by the best Scottish artists of this and preceding generations. The works of several eminent English artists are also represented. The Exhibition has been formally opened to the public.

SCHOOLS OF ART.

The Wolverhampton School.—A few gentlemen interested in this institution have met at the school, in Darlington-street, to distribute the prizes and certificates of merit among the more successful students during the past year. The distribution was made by Captain Loveridge, the president, Mr. Vincent Jackson, the hon. secretary, and Mr. Gunn, the head master. Captain Loveridge made a few appropriate remarks in reference to the importance of such an institution in a manufacturing town like Wolverhampton, and recommended the pupils to continue to attend the classes regularly, and to endeavour, by setting forth the utility of the institution to their friends, to induce them to become students. The local *Chronicle* says,—"The fact that this school is so little appreciated is almost unaccountable. It reflects no credit on many of the parents and young men, showing, on the part of the latter, a disinclination to improve themselves, and either unwillingness or inability to recognise the importance of endeavouring to maintain that superiority which English manufacturers have attained in



ALEXANDRA ORPHANAGE FOR INFANTS.—*Block Plan.*

foreign countries. One would think that as the subject of technical education is earnestly engaging public attention greater interest would be taken in the School of Art, and that there would be an increasing attendance of students."

The Sheffield School.—The annual *conversazione* of this school was attended by a large company. The council, with the efficient help of Mr. Sounes, the head-master, had gathered together a considerable number of first-class paintings and drawings for exhibition. The distribution of prizes took place in the large room on the ground floor. Mr. F. T. Mappin, the president of the council, occupied the chair. Mr. Bowler (of the Department of Science and Art) having been introduced by the president, referred to the action of Government. He reminded the audience that when the Sheffield School was founded it was one of a very few, but since then other schools had sprung up, so that where there were formerly some eighteen or nineteen receiving Government assistance, there were now about one hundred. The Government could not continue giving to individual schools of this increased number grants so large as the Sheffield School formerly received, although it was giving a larger aggregate amount. This had been the real reason for the change. The people of Sheffield had only to say the debt of their school should be removed, and the Government would help them. He believed the Government would pay 500*l.* towards it. As to the deficient annual income, the Lords of the Council had come to the conclusion that it was desirable to give further aid, and new minutes had been published within the last few weeks. This he hoped would increase the grant to the Sheffield school by about one-third. Possibly, if the debt were paid off, the council might, with this help, make both ends just meet, but the wealthy town of Sheffield ought to feel it a duty to increase its support to that institution.

ARCHITECTURAL EXHIBITION SOCIETY.—The annual general meeting of this Society is to be held at the House in Conduit-street on the 4th day of March next. A report and balance-sheet for the session 1867 have been issued.

THE ALEXANDRA ORPHANAGE FOR INFANTS.

THE Alexandra Orphanage was founded in October, 1864, under the patronage of Her Royal Highness the Princess of Wales, who gives it its name. The charity originated in the thoughtfulness of a few friends for a long period interested in the welfare of the orphan poor. It was seen, in carrying out the designs of the Orphan Working School, that there was great need of a charity for the infant orphans of respectable but poor persons, whose incomes were insufficient to permit of their making future provision for their families; and this consideration determined those who first met in conference to convene a meeting of friends, which resulted in the formation of a committee, half of whom should be members of the parent society. In the space of two years and a half ninety infant orphans have been presented for admission, of whom sixty have been elected. The purpose of the charity is to receive orphan children from earliest infancy to the age of five years, and to board, clothe, nurse, and educate them until they are eight years of age. The object and design of the founders of the Alexandra Orphanage being that its benefits shall be extended to all necessitous infants, it is to be distinctly regarded as of the very essence of the charity that at the present time and in all future times no religious distinction of any sort shall be introduced, either as a qualification for admission or after admission; and that while it is fully intended that the children shall have a Scriptural education, no denominational rules or catechisms whatever shall be adopted.

The institution is situated on the rising ground of Hornsey, occupying an area of about 500 ft. by 300 ft., with a rapid descent of 60 ft. from the high-level to the base of the hill.

The desire being to provide for separate sectional supervision, closely allied with a centralization of the whole, as the first requirement, the ground is allotted for separate detached buildings of cottage blocks, arranged symmetrically in the form of a double quadrangle, of which the main buildings, for dining-hall, schools, and offices, form the central point and feature of the design.

The cottages are arranged in couples, providing separate homes for twenty-five infants each, having its own accommodation separate and distinct, and arranged with playground or garden, terraced, to meet the accommodation level in the face of the ground. Each cottage provides a day-room, two dormitories, with nurses' rooms, lavatories, and bath-rooms: provision is therefore made for a total accommodation of 400 infants, when the whole scheme is carried out in the sixteen proposed cottages.

The quadrangle provides to each block a separate recreation-ground, and access to a covered corridor communicates with the school-rooms and dining-hall in the centre.

The central buildings include the principal centre of dining-hall, matron's house, and domestic offices, on a terraced level with a cloister, communicating immediately with the cottage corridors. The schools on the east are approached in the same way, and will abut on the Sunnyside-road.

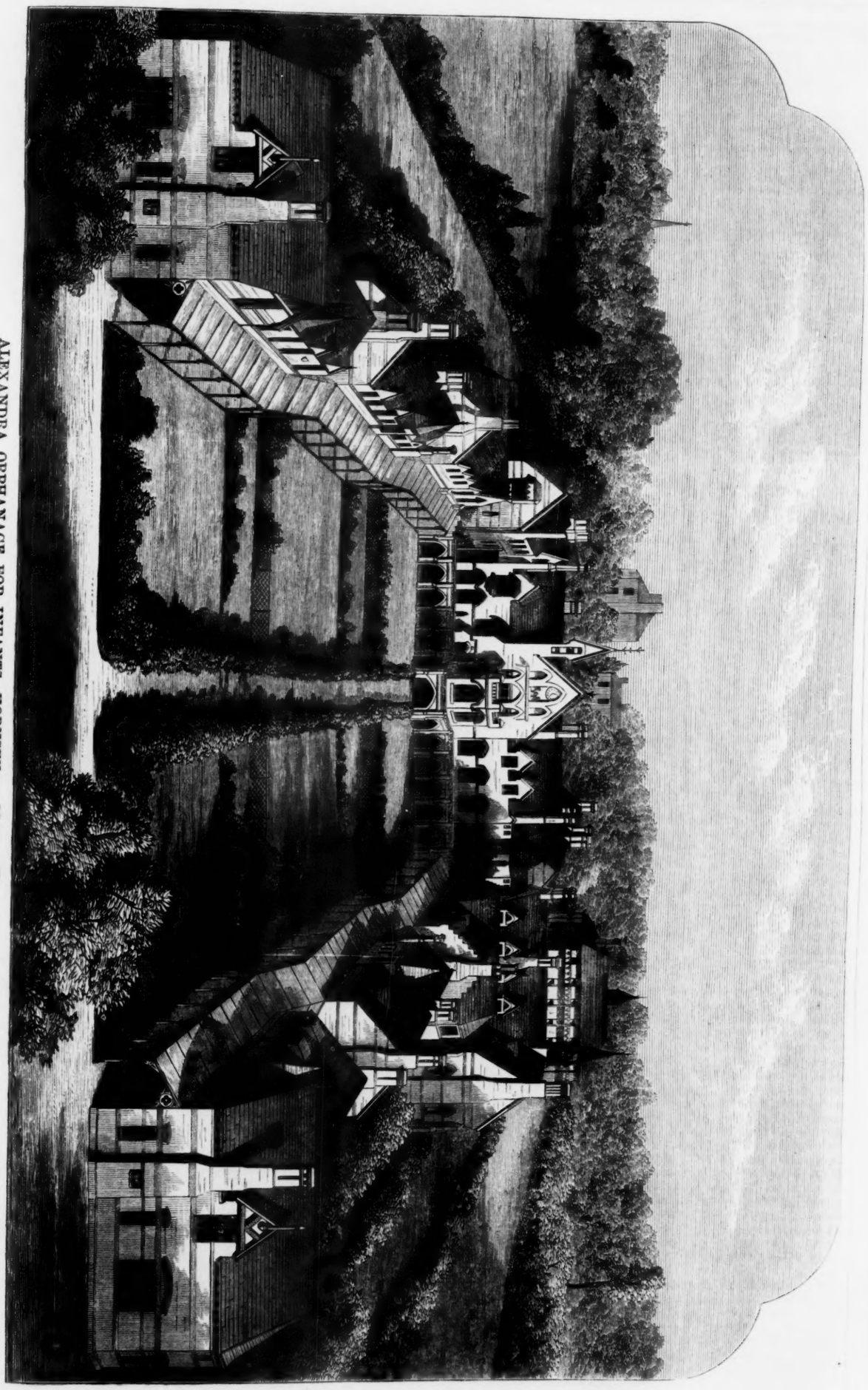
The infirmary is placed at the extreme boundary of the freehold property, and is to be erected on the principle of adapting a Swiss cottage exterior and plan to the requirements of the institution. This building will have a verandah, carried up to the eaves of the roof, and giving to three separate floors independent access, by external staircases, to the three wards, so that in all contagious and epidemic diseases the separation may be perfect, and consistent with the requirements of such an institution.

The general style of the buildings is Domestic English Gothic, of varied character to each block, the whole being proposed for execution in ordinary brickwork, with freestone dressings.

The estimated cost of the present undertaking is 15,000*l.*; while eight cottages will yet remain for future addition, at an estimated cost of 500*l.* each. Messrs. W. G. Habershon & Pite are the architects.

The first stone of the eight cottages now erected was laid by the Duchess of Sutherland, on the 6th of July last, when Earl Granville took a considerable part in the proceedings.

We have pleasure in mentioning Miss Elizabeth S. Soul as the indefatigable hon. secretary of the ladies' committee.



ALEXANDRA ORPHANAGE FOR INFANTS, HORNSEY.—MESSRS. HABERSHON & PITE, ARCHITECTS.

ACCIDENTS.

The Fire at Charing Cross Railway Station.—In the half-yearly report of the South-Eastern Railway Company, the directors state that the cost of restoration and improvements (by the use of uninflammable materials and otherwise) rendered necessary by the fire at the custom-house building at Charing Cross Station on Tuesday last, as estimated by the engineer, will not exceed 4,000*l.*

Fall of a large Chimney at Halifax.—A mill chimney, in course of erection, and which had attained an altitude of 40 yards, has fallen at Lee Bank, Halifax, doing much damage to two adjacent mills. The accident happened on the premises of Messrs. W. H. Rawson, who have just completed a seven-story mill, which, with an adjoining mill, are about to be occupied in cotton spinning. Until within a few minutes of its fall, the chimney was considered quite safe. It, however, was observed to oscillate several times, and two masons were in consequence called from the top. They had been down only about ten minutes when the chimney fell at its full length. A slip at the foundations, it is thought, must have led to the fall of the structure, which was of stone, having a 6-ft. flue.

Accident at the New Exchange Works, Manchester.—The site of the intended building is one immense sand-pit, and workmen are now engaged in excavating the sand and carting it away, for the purpose of allowing the foundations to be put in. Adjoining Market-street the foundations are carried to a depth of about 20 ft. below the level of the street. Three excavators were engaged in one of the sandpits when a huge mass of sand slipped, causing the wooden supports to give way, and the three men were buried up to their waists in the sand. Fortunately, the wooden supports fell in such a manner as to serve as a protection to the heads of the men. Mr. Marshall, the clerk of the works, and Mr. J. Allcock, the gang foreman, with a number of men, set to work and rescued the three men from their perilous position.

Fire at the Limerick Gas Works.—During the prevalence of a most violent squall from the south-west, with vivid and constant flashes of lightning and a deluge of rain, the immense gasometer of the United General Gas Company, which contained 200,000 ft. of gas, was ascertained to be in flames, which burnt for an hour. The accident was occasioned by a strong gust of the wind having caused the gasometer to cant over against the gable of the wall where it was set; the wall gave way, and then the gasometer was blown entirely upon its side, the basement stonework making a large breach of several feet near the lower water-rim, from which the gas rushed out, and, coming in contact with a lamp, caught the flame and lighted up. Nearly all the gas was burned out.

THE CONSTRUCTION OF VITRIFIED FORTS.

AT a recent meeting of the Glasgow Archæological Society, Mr. Galloway in the chair, Mr. Honeyman read a paper "On the Construction of Vitrified Forts." After referring to the various theories of construction which have been propounded, he remarked that these entirely failed to account for the phenomena presented in the remains. He then proceeded to describe the vitrified fort on Dunskeig Hill, at the entrance of West Loch Tarbert, and certain peculiarities of construction there, which, with other examples, led him to the conclusion that the walls—some of which are fully 10 ft. in thickness and vitrified throughout—were constructed by a series of furnaces on the walls, not by the application of heat to the external surfaces. The paper was illustrated by numerous specimens of vitrified work, many of which were from the collection of Mr. W. Keddie. It is evident, he said, from the condition to which the most intractable rocks have been reduced—mica slate being frequently found converted into a material resembling pumice stone, light and porous; while green stone has been completely liquified, so as to glaze over and agglutinate the loose materials over which it has been melted—that the builders of these curious structures must by some means have applied an artificial blast to their furnaces. Mr. Honeyman suggested that the natives may have pressed into their service the gales of such a season as this. He thought some light might be thrown on the mode of construction if gentlemen who had an opportunity of visiting the remains would observe:—1. If the stones composing the walls had been broken down, or if they were smooth and round like boulders or stones worn by the action of water. 2. If they adhered in consequence of fusion, or because agglutinated by a fused material of a totally different character. 3. If the vitrification was more complete towards the outside, or otherwise. 4. If the walls showed any evidence of horizontal courses. 5. If there were any indications of transverse or longitudinal portions more completely calcined than the rest of the work; and 6. If the walls were more completely vitrified towards the north and east than towards the south and west.

A discussion followed, conducted by Messrs. Hart, Galloway, Mackinlay, A. D. Robertson, Michael Connal, and other gentlemen. It was considered desirable that the subject should be further investigated in the light of Mr. Honeyman's theory.

COMPETITIONS.

Darlington Union Workhouse.—On the 24th instant the Board of Guardians met, and decided the above competition. Mr. Wm. Lee, architect, London, was called in to assist in the selection, and the designs bearing the motto "Nota Bene" were selected as the best. The first premium of 40*l.* was awarded to these plans, and the author of them, Mr. Charles J. Adams, of Stockton-on-Tees, was appointed to carry out the works, which are to cost about 10,000*l.* The second premium of 30*l.* was awarded to designs under motto "Economist;" the third premium to motto "(A)," A in circle.

St. Mary's Church, Lichfield.—The design selected for this church is by Mr. James Fowler, of Louth, and we understand it will be carried out at once under his direction.

THE ARCHITECTURAL ASSOCIATION.

THE ordinary meeting of members was held at the House in Conduit-street on Friday evening, the 14th instant, Mr. Lacy W. Ridge in the chair.

The following gentlemen were elected members of the Association:—Messrs. T. E. Cole, Alfred Bovill, and B. A. Mayhew.

Mr. J. D. Mathews (hon. secretary) explained, with the assistance of the black board, a plan which he had under consideration for improvements in the warming and ventilating of private houses by the introduction and circulation of waste heat from ordinary stoves. He also described (in connexion with the same subject) certain improvements in the construction of gas-chandeliers, by which the light could be concentrated without shadow, while the noxious properties of the gas would be carried off without discolouring ceiling or spoiling furniture, pictures, &c.

The Chairman observed that the subject was one of such great importance, both in a sanitary and economical point of view, that he hoped the Association would be able to devote an evening to the discussion of it.

Mr. Tarver read a paper on "Symmetry from a Gothic Point of View," in which his object was to prove that the study of Gothic architecture relied as much on an observance of symmetry as Classic architecture, which he considered out of place in England, but to which the term is generally thought exclusively applicable; and he believed it was the too easy acceptation of this inference that had led to the astonishing vagaries in much modern Gothic work. By analyzing the terms "balance," "proportion," and "symmetry," he pointed out that the first referred to an instrument for testing the relative weights of two bodies, as, for example, to a centre flanked by twin masses in equipoise, and so to the design of most Classic buildings (Mr. Lovesdale supplemented this remark by the instance of a steel-yard, in which two bodies of *different* weights counterbalanced each other by being placed at different distances from the centre, as was the case in some Gothic examples); that "proportion" dealt with single features as much as could be comprehended in one glance; but that the term "symmetry" meant literally "measuring together," and might be taken in a more comprehensive sense than the others. He thought that balance was right when there was no reason to the contrary; but that we should recognise the principle that symmetry should not be confined to the subdivision of a façade into two equal halves, or even to façades at all; but that it should guide the distributive form and size of every limb and feature of a building.

Mr. Potter, observing upon the new public Offices in Downing-street, designed by Mr. Gilbert Scott, said that in the upper rooms there was not that abundance of light which Lord Palmerston had declared to be so essential in all public buildings in this country.

Mr. Quilter contended that symmetry in Gothic architecture was not the balancing of the parts, but the proportioning of all the parts, so that the entire building might be harmonious.

Mr. Redgrave, while declaring himself quite unprejudiced as regards the rival claims of Gothic and Classic art, could not agree with Mr. Tarver in condemning the design of St. Pancras new Church, built by Mr. Inman. The spire was not, he held, so incongruous as it had been represented to be; although he was prepared to admit that the jumble of spires in the metropolis was anything but agreeable to the educated eye. Sir Christopher Wren's city spires were no doubt the most successful; but those who condemned St. Pancras spire on the ground that it represented one temple upon another, ought to know that there was a precedent in ancient art for such an arrangement. In his opinion the description of Classic architecture which ought to be encouraged was the Renaissance. There were many fine buildings in Italy in that style which would suit our climate very well, and which would be more appropriate than designs borrowed from the rigid antique of Greece. On the whole, however, he thought that Gothic architecture was that best suited to our climate. It had, no doubt, faults, but these might be avoided; and he held that it would be better for architects to study so as to avoid those blemishes rather than to adopt a manner which might be described as a jumble of many styles.

THE INSTITUTION OF CIVIL ENGINEERS.

AT the meeting on February 18th, the paper read was "On the Supporting Power of Piles; and on the Pneumatic Process for Driving Iron Columns, as practised in America," by Mr. W. J. McAlpine. The first part of this communication related principally to the experience gained in driving 6,539 piles, an average depth of 32 ft., for the foundation of the Government graving dock at Brooklyn, N. Y., when the support was mainly derived from the adhesion of the material into which the piles were driven, and slightly from their sectional area. The piles were in rows 2½ ft. apart, and at transverse distances of 3 ft., all from centre to centre; intermediate piles of tough second-growth oak being frequently employed. The main piles were chiefly round spruce spars, very straight, from 25 ft. to 45 ft. long, and not less than 7 in. in diameter at the smaller end, and on an average 14 in. in diameter at the larger end. From a record kept during the progress of the work, it was ascertained that it took two and one-third blows to drive each foot of pile, and that the distance moved uniformly diminished from the first to the last blow, ranging from 8 in. at the beginning to no movement at the end, the average distance moved by the last five blows being 1 in. A considerable number of the piles were driven by a Nasmyth steam-piling machine, with a ram of 3 tons, and a stroke, or fall, of 3 ft., and making from sixty to eighty strokes per minute. The other machines were generally operated by steam-power, giving an average of a blow per minute; but occasionally the hammers were hoisted by manual and horse power. The rams in the latter machines were of cast-iron, swelled out at the bottom to concentrate the weight at that point, and weighed about 2,200 lb. each, though some were used of 1,500 lb.; the fall being 30 ft. It was observed that the heaviest ram, when striking blows of the same effect as lighter ones, did the least injury either to the head of the pile or to the protecting iron ring, and this injury was still less with the Nasmyth hammer. It was also found that no advantage was gained by the fall of the ram being more than 40 ft., as the friction on the ways then prevented any increased velocity to the ram when falling from a greater height. With the Nasmyth hammer, piles were driven 35 ft. in seven minutes, while with the other machines similar piles required one hour, or more, to drive them the same distance.

Experiments were made at different times to ascertain the weight which the piles would sustain. For this purpose a long lever of oak timber was employed, with which a number of the foundation and coffer-dam piles of nearly the same size, and driven under exactly similar conditions, were withdrawn. It was thus ascertained that a weight of 125 tons was required to move a pile, driven 33 ft. into the earth, to the point of ultimate resistance, with a ram weighing 1 ton, and falling 30 ft. at the last blow. These

trial piles averaged 12 in. in diameter in the middle. From a number of other experiments, it was believed that the extreme supporting power of the pile, due to its frictional surface, was 100 tons, or 1 ton per superficial foot of the area of its circumference. From an analysis of the experiments, the following general laws seemed to have prevailed in these cases:—1st. That the effect of lengthening the fall of the ram was to increase the sustaining power of the pile in the ratio of the square root of the fall. 2nd. That by adding to the weight of the ram, the sustaining power of the pile was increased by 0·7 to 0·9 of the amount due to the ratio of the augmented weight of the ram. 3rd. That a pile driven by a ram weighing 1 ton, and falling 30 ft., would sustain an extreme weight of 100 tons. The formula based upon these data, as applicable to rams weighing from 1,000 lb. to 3,000 lb., falling from 20 ft. to 30 ft., was $X = 80\ (W + 0{\cdot}228\sqrt{F} - 1)$, in which X was the supporting power of a pile driven by the ram W, falling a distance F; X and W being in tons, and F in feet. The author was of opinion that, under the most favourable circumstances, the pile should not be loaded with more than one-third of the result given by this formula; and when there was any danger of a future disturbance of the material around the pile, or when there was any vibration in the structure which might be communicated to the piles, the load imposed should not exceed one-tenth.

The bearing support due to the sectional area of the pile had not been considered in the preceding inquiry; but numerous experiments had been made, which gave results of from 5 tons to 10 tons per square foot.

THE FITTINGS OF COTTAGES.

A LADY, dating from Quebec, favours us with some observations on the planning and fittings of economical dwellings for working men. We print the portion relating more particularly to the second part of the subject:—It has been proposed by some architects, who carried their ideas of economising space to an extreme, to make the vacancy under bedsteads available by having drawers to slide under the bed. This is by no means advisable. The space beneath the bedstead, for the sake of health as well as of cleanliness, should be open, and daily subjected to the supervision of the broom.

In domestic architecture it has been much the fashion of late to have no closets. This omission entails much expense on the occupants of houses, and is eventually injurious to the landlords, as bringing in and out large articles of furniture, such as presses and wardrobes, can seldom be done without damage to the walls. The open dressers, so ornamental with their rows of plates and dishes, have generally given way before the swarms of flies which seem ever to increase and multiply; and although it has been stated that the presence of these insects is so beneficial in some respects that Europeans in New Zealand carry them in boxes to localities where they were formerly unknown; yet, whatever their qualities may be, it is desirable to keep things as much as possible from their touch, and to this end closets in kitchens are indispensable. Closets are more easily cleansed than drawers; and it was no improvement in finishing to expel the old-fashioned linings, which formed a defence against the entrance of vermin. Closets are convenient even in the dining-rooms of the opulent; they are *requisites* in the apartments of the working-classes. In sleeping-rooms, the closet should, if possible, be large enough to stand in, have rows of shelves transversely from the floor to the ceiling, at the sides, with a long shelf lengthways, under which should be rows of pegs. If recesses by the fire-places do not admit of closets in the kitchen, they should be put up as fixtures.

The problem how to dispose of what may be termed the refuse of human life is a disagreeable but most important one. The waste in cookery and preparing food may be reduced by good management: rags may be kept for the rag-gatherer; bones, and fragments of metal and crockery, which so frequently disfigure the road-sides, may be given to collectors of such things; but still there must be refuse, there must be a dunghill, and this, with other nuisances, should be removed at short intervals to serve for manure.

Doubtless, those houses should be most healthy that have no drains passing under them, as the vapours and bad air fail not to penetrate above, and the most costly appliances of luxury do not always obviate such inconveniences; but round the habitations of the poor, without care, damp and dirt gather fast, and the question still remains how to dispose of the waste water without a sink or waste-pipe. Can it be safely suffered to be thrown out into the yard or the field, and suffered like the rain to permeate the soil? Perhaps a small tiled drain to carry off soaped and greasy water is as good a way as can be devised to keep the surroundings of the houses of the working-classes dry.

A labouring man who has to leave home early, and at a regular hour, requires a meal speedily and comfortably prepared; when he returns, he wants refreshment and repose in comfort. Now, very few articles are required for actual comfort, and every article not necessary for personal convenience and enjoyment gives trouble, and is in the way, when there is only one pair of hands to keep all in order. In selecting furniture what is strong and durable should be chosen. Cleanliness is the grand element of comfort; and unpainted wood being most easy to keep clean, is the nicest for the living-room. Wooden-seated chairs wear best, and are the healthiest. The little round claw-table is pretty, and suitable for the mother's afternoon work; but it must not supersede the deal-table, 4 ft. long, indispensable for meals, for the preparation of food, and for ironing. Bedsteads, with laths that can occasionally be taken out and washed, are preferable to those with ticks or close boards. Curtains are quite unnecessary. In the climate of England hair mattresses are more to be recommended than wool mattresses, or any mixtures of *flock*, but ticks filled with straw, and pillows stuffed with chaff, are very good. Fine shavings make excellent beds. Where the father or the boys have the valuable knack of carpentering, a few boards and two or three barrels can be made very serviceable. A bedstead can soon be knocked together; one barrel can serve as a washhand stand, another as a side table; a barrel can be cut into two seats for children, and a barrel can be made into a commodious arm-chair, and with a little ingenuity made to look well. For the floors, cleanliness is the best ornament; and to insure this, it is not requisite that a woman should go down on her knees to scrub. The process of cleaning the floor may be rapidly and effectually performed with an iron mop. The only coverings requisite are large mats at the doors, and rugs before the fireplace and by the side of beds. Tin kettles and saucepans are less durable than iron, but far more expeditious in cooking, especially in boiling water. Dwellings thus arranged, with as much space as is possible for the living-rooms, and as few articles of furniture as will suffice for convenience, have a better appearance, and will be found more healthy, cleanly, and comfortable than the confined and encumbered rooms in which the working classes usually live. A. E.

MR. GLADSTONE AND TRADE UNIONS.

SIR,—If any one expected the deputation to Mr. Gladstone would effect the promised object of their visit, he must have been greatly disappointed. The public had been led to expect that a selected number of working men, thoroughly acquainted with the subject, and speaking with authority as representing the whole body, would (as was somewhat boastfully predicted) expose popular fallacies, make clear the benign principles of restriction, elucidate political economy generally, and so enlighten the mind of the statesman that he should humbly acknowledge himself to have been entirely mistaken. The further effect proposed was to provide a solid groundwork for legislation, and to gain the sanction of law for what has by some been considered a selfish and odious tyranny. I confess to having looked forward with much interest to this discussion, and have carefully read the report, hoping to find some grains of sound argument amongst the crude mass of mere assertions. In the first place, the deputation evidently were not all of one mind; several individual members stoutly upholding practices which Mr. Potter stated were confined to a small minority of the trades; such as the restriction of apprentices, and the prohibition of piecework. But surely, before undertaking to enlighten an obtuse and supposed hostile public, the members ought to have agreed amongst themselves. Moreover, at a later meeting, it was announced that several large and influential trades altogether repudiated the self-constituted championship of the deputation. If they really wish to enlighten the public, and to meet the case—as the leader of the deputation said their intention was—"fairly, openly, and without equivocation or reserve," let some one on their behalf publish a collection of trade-union rules, supplemented by a narration of trade-union practices, the materials for which would not be difficult to obtain. Then let him state their case, adduce their arguments, say which of the practices they uphold and approve of, and which they disown *and will discourage*, and they may rely upon it the public to whom they appeal will give them a fair hearing and pass a just verdict; but the work must be done fairly, honestly, dispassionately, and with a sincere desire to arrive at the simple truth. Anything like an attempt to deny well-known and proved facts, or to throw dust in the eyes of the readers by rhetorical special pleading, will only deepen the feeling they complain of, which, rightly or wrongly, certainly exists, that they practise things which would look very ugly in print. Mr. Gladstone evidently perceived the heterogeneous nature of the body he had to deal with, and that they were so fully persuaded of their power to *teach* that they had nothing to *learn*. AN ENGINEER.

CONSTRUCTION OF FIRE-PROOF DWELLING-HOUSES.

AMIDST all the modern improvements and appliances for house building it appears remarkable that so few attempts have been made to render our dwellings, if not entirely fire-proof, yet not wholly destructible by this insatiable element. Whosoever has been roused out of midnight slumbers by the fearful cry of "Fire! fire!" will need but little advocacy to induce him to adopt any feasible mode in his power to construct a dwelling so far fire-proof that the destruction may be reduced to a minimum, or at most confined to only one apartment, and the loss of life all but impossible.

The common mode of house building is so fraught with danger from fire that the wonder is how any portion of the building or its contents is ever saved from the devouring flame. Indeed, I would ask the most superficial observer is it possible to lay timbers for ignition in a more scientific manner than they are usually placed in our common dwelling-house? Is there any kitchen fire-grate laid for the express purpose by our servants so skilfully disposed for the ostensible purpose? First, there are the joists for the floors, then the quarter partitions, then the rafters and battens of the roof, and afterwards the lathing and battening for papering the walls; also the flimsy staircases, all nicely spaced, and just adapted for burning at a minute's notice. Let any person look through or upward at a house that is what is termed carcassed in, and say whether he could devise anything better calculated for combustion?

And this insecurity exists for the sake of a little more expense in the first place,—say 25 per cent. addition for a first-class house.

In the first place, I propose to arch over the basements, either in the way I shall recommend for the next floor, or in the old-fashioned way of groins. The other stories I should arch over in the same way as a coach-head trimmer, taking a bearing upon all the walls, with a semi-elliptical curve.

The materials I prefer are the common vertically perforated brick laid flat ways, and jointed with Portland cement; it is almost needless to say that these should be laid well and carefully, so as to break joint as much as possible, especially at the groins, or angles.

Over large rooms, or openings, a course of plain tiles may be bedded upon the bricks, but in small spans a rendering over in cement would be sufficient. The reason I prefer the perforated bricks is on account of their being lighter, and they also afford a good key for the plastering underneath.

The joist can be laid into the walls in the ordinary manner, or 4½-in. brickwork may be carried up from the springing of the arches in the spandrels, or, if more desirable, by using a few iron ties the wood joist can be laid independent of the walls altogether.

On coming to the roof, the arch may be varied to any shape, and the rafters bear upon it; indeed, by using ornamental iron ties across the rooms, the roof may be formed without any other covering than the arch, cement, and tiles.

The staircases may be turned upon segment centres, and by working in the arch occasionally a course of heading bricks, or laid lengthwise, the core for the steps may be formed, and may afterwards be lined or cased with wood. At the springing of the arch for the stairs the floor-arch could be strengthened as much as may be deemed necessary.

This scheme would necessitate each story to be carried a little higher, and the walls made about half a brick stouter; but it would save all the lathing to ceilings.

It is obvious that in the event of fire breaking out it would be confined to the room where it broke out, and, indeed, would die of inanition. The advantages for carrying water-pipes, gas, bell-wires, and such like, along the spandrels is too plain to require pointing out.

This is no new idea, although I do not know of any building where it has been carried out in its entirety; and having but a small country business, I have never been able to persuade any proprietor to incur the additional expense required. The objection usually made is the outward thrust upon the walls from the arch; but from the lightness of the materials employed, I think this will be very small; and there are many modes of tying in and counteracting this which will suggest itself in practice.

GEORGE BURCHETT.

AIR-OR-NOT COMPANY (LIMITED).

HAS the promulgated scheme for laying on country air into London houses (in the same manner as gas and water) *blown up?* Oh, how delightful it would be to repose in a pure atmosphere within the sound of Bow bells; to be able to dress, toilet, breakfast, and take the country air simultaneously and expeditiously. It would be a boon to mammas, for the winds (from bleak Highgate or sunny Sydenham) could be tempered to the shorn lambs in the nursery; the children could revel in refreshing draughts of half-and-half, and no bother of mud, rain, ditches, &c. Night air is not so beneficial; so none but daylight-gathered ought to be supplied from odoriferous roses and mignonette plantations, and from warm conservatories in winter. I presume the only plant required would be a windmill to work gigantic bellows.

Our commercial atmosphere requires purifying, for it has long been stagnant and in bad odour.

Directors of bubbles, awake to aerology! No company formed to bring it into operation yet? Where are the limited-liability mongers? *Dum spiro spero.* It is a project that requires ventilating. It is ill wind that blows nobody good: this may to *them*, if it do not to the shareholders or public.

R. T.

FRENCH AND ENGLISH WINDOW GLASS.

SIR,—The Society of Arts, as you have stated, raised a fund purposely to send a select number of workmen to visit and report upon the progress and improvement made in the different branches of industry as shown at the Paris Exhibition. Every workman in the branches of industry thus represented ought to become acquainted with the reports sent in to and published by the Society of Arts, so that he may learn something new, correct something wrong, or profit by them in some way or other.

The window-glass trade was represented by Richard Pearsall, glass-maker, near Birmingham, He is a workman of Messrs. Chance, Brothers, glass manufacturers, and no doubt, was recommended by them as a suitable person to be sent to Paris, for the purpose above stated. No report published can be more unsatisfactory than the one sent in by Mr. Pearsall. It is so brief, it covers but little more than one page, and so empty as to be absolutely useless to any one engaged in the trade. The Messrs. Chance, Brothers, have many workmen in their employ who, without going to Paris, could, in their dinner-hour, have drawn up a much better report concerning the manufacture of glass in England, France, and Belgium.

Sheet and rolled plate glass and glass shades are imported into England from France and Belgium, at from 30 to 50 per cent. cheaper than the same kind of articles can be bought from English manufacturers; yet Mr. Pearsall goes to Paris and sees these things exhibited, and to the various manufactories in France where they are made, and in his report there is not a single hint either to manufacturers, merchants, or workmen, whereby they may profit.

In consequence of the difference in the price of foreign and English-made sheet glass and glass shades, I can venture to affirm that two-thirds of the former are used to one of the latter, thus depriving hundreds of English workmen of labour which naturally and reasonably belongs to them. It is true the English make is superior to foreign make; but what does that signify if the latter is preferred, on account of its price, to the former? I think, if the English glass manufacturers would make quantity their first aim, instead of quality, they would drive the foreign glass trade out of the English market, would find work for many of our unemployed, and in the end would supply an equal, if not an increased, quantity of the superior article which they now send into the market.

A WINDOW-GLASS CUTTER IN A CITY HOUSE.

FORTIFYING POLICE STATIONS.

SIR, — Absence from town prevented my noticing the paragraph headed "Fortifying Police Stations," in your issue of the 15th inst., which, from the high position occupied by the *Builder*, is calculated to give an erroneous impression better avoided.

There is no foundation whatever for the assertion that Messrs. Clark are manufacturing shutters for the station at Scotland-yard. The simple facts are these. A shutter was required for a particular room that had no shutter before. I applied to Messrs. Clark for a price, and they handed me also a sample of their manufacture, which they asserted was bullet-proof. This question was disposed of by sending two shots from a revolver *through* it. Mr. Peard happened to be with me at the time, and proposed to me a much simpler contrivance to meet the same end. A series of experiments were arranged, and as the question of making this shutter bullet-proof *had* turned up, a section for a shutter that could not be pierced was decided upon. Whilst these experiments were going on, Messrs. Clark produced a second sample, which on being fired at perfectly resisted the shot.

Under these circumstances, I directed Messrs. Clark to fit up *one* shutter, and Messrs. Peard & Jackson to fit up two other shutters, the latter being less expensive, less liable to derangement, and closed in one-fourth the time.

THOMAS C. SORBY,
Surveyor to the Metropolitan Police.

WITH reference to the paragraph in a recent number of the *Builder*, headed as above, Messrs. Peard & Jackson say,—"That having, somewhat accidentally, been shown the result of an experiment, we suggested shutters of a totally different construction to what had at first been recommended as best adapted to the purpose. Our idea was entertained; and, after some severe tests, approved by the police authorities. We have made and fixed *two* of these shutters, which are the only ones 'so constructed that they can be closed almost instantaneously,' while they are of themselves 'proof against any fusilade of small arms;' and are also adapting the principle to two pairs of ordinary existing box-shutters."

STYLES NOT INVENTED.

WHEN an architect, such as, for example, the architect of the Temple of Theseus, makes an original design so full of beauty, and so perfect in its proportions, and with such appropriate ornamentation, that hundreds of other architects endeavour to imitate his work, he may be said to invent a style, or, as I should call it, found a school of architecture.

A new school may be founded; but first we must learn how to copy what has been done before. There are two ways of copying, both professing to be the right way.

One is to imitate mouldings and ornaments exactly, without regard to general proportions; and thus is produced in this present century a building in the style of another long-past century: and every judge and critic says its mouldings are correct, its ornaments are correct, its tracery is correct; all, all of the same period, all true Gothic, all true Greek, as the case may be.

But some one who is not acquainted with these supposed elements of correctness will say, "That may be; but there is something about the building that I do not like, and cannot say exactly what it is." In this manner was the Parthenon copied from the Temple of Theseus; the latter of which has the general repute of being by far the best proportioned. And this brings me to the other way of copying, which, and which alone, will lead to the foundation of as many new schools of architecture as the greatest admirer of originality can desire. If I wanted to get an idea from, for example, this said Temple without copying it exactly, I should begin thus:—

The *school* is Greek. That I shall copy.

The *mode* is Doric. That also I shall adhere to.

The *order* is ——? Well, I must measure its proportion, and fix upon a scale of orders. The lowest order is when the height of the columns is $\frac{7}{2}$ of their distance between centre and centre, as is almost always the case in old English examples of *monostyle columns*. You cannot have a lower order than this, and you cannot have a column of less than one shaft.

Again, in the tetrastyle columns of the English school the height is $\frac{4}{1}$; in the next, the octostyle, the height is generally $\frac{4}{1}$: this is the third order, then. Now, the requirements of my building make it almost imperative to have the height of my columns $\frac{4}{1}$ of their intercentral distance. So my building will be of the fourth order. And you will see, by an extension of this scale of orders that the XX style column would be $\frac{4}{1}$ high. Now count the vertical lines in the columns of the Temple of Theseus; and now measure the height and *mean* distance apart. Now you see why this good old Greek design and these good old English designs are equally pleasing.

To return to my own design. As we have seen, it will have to be duodecastyle to *look well*: too many shafts to have separate capitals, or to arrange in a diagonal square: so we will arrange them in a circle under one capital. There is a reeded column. No, we must not have an entasis or diminution, because we are too far apart for an architrave, but too near to render pointed arches necessary. We must have half-circular arches, as a medium between the two.

Mouldings.—In that temple they are parabolic curves; in our low English orders circular,—two extreme conic sections. Then ours must be mean conic sections, — that is, ellipses. This system of moulding is carried out in many examples of many schools.

This is the right way to copy, and at the same time the right way to *originate*; for, look at our new design! Where is its resemblance to the Greek temple?—not a feature left to show whence we started!

WALTER SCARGILL.

SIR,—Your correspondent, Mr. H. W. Brewer, is surprised Mr. Fergusson should suppose it possible to "invent" a new style, such being always "developed." Mr. Fergusson, however, says distinctly, "No man or set of men can at once *invent* a new style. It must be *developed* out of some previous form, and by a slow and gradual progress of growth." But is the distinction, after all, of real utility? In his incomparable "System of Logic," Mr. Stuart Mill forcibly points out, that different words do not necessarily indicate the existence of corresponding different qualities in things; so, I suspect, invention and development are, in actual effect, and so far as practical usefulness is concerned, virtually convertible and synonymous terms, as applied to mental processes touching new styles of architecture; for these — the simple statement of the fact coercing conviction—are both invented and developed. Classic orders and Gothic windows, with round and pointed arches, could scarcely have been at all developed if they had never actually been invented; and, to my mind, development has no precisely distinct meaning beyond aggregating, maturing, and adding to inventions composing styles.

Mr. Brewer's startling assertions, that "new styles have always arisen from copying the works of a former age," is more paradoxical than instructive. Whether or not some of the ancients began by copying is perfectly immaterial to the point at issue; for it is manifest that so long as there was "only copy-work," there could not be any original work at all; and "copying the works of a former age" was thus too antecedent to the new style to be considered in connexion with it, and related, in fact, not to

the new, but to the old style. As only copies could "arise" from copyism, the invention and development of novel features were consequent, not on copying, but on departing from the old style, and in this way forming a new one.

Finally, Mr. Brewer intimates that as the development of a new style "generally took from three to four hundred years" in ancient days, one "might" now be created in "five or six hundred years." Mr. Brewer evidently thinks we have sadly deteriorated (to about half the value of the old folks), and are in a very bad way indeed. But, setting aside analogies where there are no analogies, perhaps a more hopeful view may be taken. Of course there is no sign of a "new style arising from copying the works of former ages," which we have already done for between three and four (the ancients' allowance) of the (moderns' allowance) five or six hundred years. What is really wanted is a *true* style, reflecting neither Classicism nor Mediævalism, but Modernism, and thus subsidiarily a *new* one. As all archaic styles first arose in comparatively barbarous times, and the true and new style of the future will start from the most civilized of all times, its development will surely be proportionately more rapid. But to attain this consummation we must depart from copyism, and cast aside that undue reverence for antiquity and that singular depreciation of our own powers in this calling, which have rendered modern architecture the reproach and shame, as the one retrograde art, of the age. "For in reality," says Lord Bacon, "as we look for a more mature judgment from an old than from a young man, just so it is fit that much greater things be expected from our age, if it knew its strength and would endeavour and apply, than from the old times, as being a more advanced age of the world, and enlarged and accumulate with numberless experience and observations."

EDWARD L. TARBUCK.

THE GREAT INDIAN PENINSULAR RAILWAY.

SIR,—The state of the bridges and viaducts on this line is far from satisfactory, and, unless the company take prompt action, I have no hesitation in stating that the traffic on many sections will be suspended. In several cases the passengers have to leave the trains "and walk across," a distance of upwards of a mile! For an old Indian with something of the Salamander about him this is bad enough, but for English ladies and their families to walk such a distance in a temperature of 138°, many of them suffering from intermittent fever and ague, without a *tattee*, a *palaquien*, or a *tonjon*, the journey is really perilous and desperate.

The cause of this ruinous condition of the works is obvious, as every European who has travelled over the line can testify. The enterprisers employ too many native inspectors, instead of sending out skilled European foremen to guide and direct the works. Now, as these native inspectors are generally high *caste*, and consequently devote much time to the worship of the "big God of the Hindoos," therefore the native workmen, many of whom are low *caste*, scamp the work in their absence. Need a word more be said?

Besides, the native mechanics are, in matters of science, far behind Europeans, as, indeed, Asiatics generally are. Let the company send to India qualified engineers and inspectors, and let the public thoroughly understand that the Great Indian Peninsular Railway is not a huge quantity of mis-spent labour, or the works of Sisyphus rolling up stones to come down again.

Is it not a matter of surprise, when it is considered the numerous accidents through defective workmanship which have occurred on this line between Lanoly (top of the Ghauts) and the "Snake City" of Nagpoor, that the enterprisers should remain like flies in winter—in a state of suspended animation.

PIERSE ARTHUR.

ST. JOHN'S CHURCH, WEYMOUTH.

SIR,—I regret that Mr. Bury should have made statements in your paper in connexion with the above church which are not correct. I can only say that he is labouring under a mistake, and that your announcement of the 25th of January was quite right. I beg to refer him to the Rev. J. Stephenson, and hope that you will do me justice by the insertion in your paper of this communication.

ROBERT C. BENNETT, Architect.

THE CHANNEL RAILWAY.

SIR,—I beg to forward you a plan for a railway between England and France. A bridge being the mode of communication proposed, this letter relates principally to the piers or supports of such bridge. It is proposed that such piers be built of iron; that they be hollow, and somewhat of the shape of a mushroom turned upside down. The essential characteristic of this plan is that such railway, or, rather, the piers supporting the bridge constituting such railway, can be built on land, and afterwards floated to their several positions, and then sunk and placed in position, by filling them with water. When so sunk they would remain firm and immovable, by the weight of the water inside them, and the attraction of gravitation. The bottom portion of each pier would somewhat resemble a large gasometer, or a round engine-shed 300 ft. in diameter; and the top portion the Eddystone Lighthouse, or an iron column 160 ft. high and 30 ft. in diameter at the top. After such piers had been so placed in position, they would resemble and constitute so many iron islands. Wherefore, a suitable number, say a few scores, of such iron islands being made and existing between Dover and Calais, it is presumed that a road, or a highway, or a railway would simply forthwith follow, as a matter of course. For a comparatively trifling sum,—say 50,000*l.*,—it is believed that the feasibility of this plan could be tried, and tested and verified at once. One of the largest of such piers might be thus constructed (in sections) at Birmingham, sent by rail to any convenient harbour, there put together and completed, afterwards floated to its allotted position, half-way between England and France, and then and there sunk and placed in position by filling it with water. When so sunk, the bottom portion of each pier would be in effect something like 100,000 tons of iron, of the shape of a penny-piece, lying flat at the bottom of the sea; and it is believed it would so remain for generations. The top portion being an integral part of and firmly affixed to such bottom portion, would of simple necessity remain firm and immovable; and the same being perfectly smooth and round, would consequently offer the least resistance of anything to wind and waves.

J. R. H.

CAN A BUILDER CHARGE FOR MAKING AN ESTIMATE?

SIR,—Some time since I was invited in a limited competition to tender for a church. The committee did not reserve to themselves the right to reject the lowest or any tender. My tender was the lowest, but the amount was more than the committee expected. The architect was instructed by his clients to request me to meet him at his office (a distance of 160 miles from my place of business), to go through the estimate, and see where it could be reduced. This was done, but after some further correspondence, the committee decided to do the work themselves, under the superintendence of a clerk of works. The foundations were put in, but they found this too expensive; and (through their architect) asked me to go over my estimate again,—this time with a view of adding to the tender in consequence of rise of wages, &c. I was put to much trouble, but at the last moment, and without any explanation, the committee broke off the negociations, and gave the work to another contractor, who was in the first competition some 250*l.* above me. Am I not entitled to be paid for my trouble? and can any of your readers name any legal decision bearing upon the point? If they can, they will oblige,

A BUILDER.

*** Under the circumstances stated above, our correspondent would seem unquestionably to have a legal claim. Much would depend on what was said or written during the transaction.

STAINS ON STONE.

I SHOULD be obliged if any of your readers would inform me of any solution with which a light freestone chimney-piece might be coated, so as to preserve it from injury by finger marks or greasy stains.

S. B.

LETTERS ON MARBLE.

CAN any of your readers inform me, through your journal, of the best, quickest, and most durable method of preparing engraved letters in marble, or any other hard stone, so as to receive gold leaf?

F. M.

DESTRUCTION OF PORTMAN MARKET BY FIRE.

AN extensive fire took place on Sunday morning last in Portman Market, Marylebone, whereby twenty-three shops have been destroyed. The fire commenced in a boot and shoe warehouse, No. 2, in the market, and then laid hold of the adjoining premises, No. 1, belonging to an ironmonger. From these two buildings the flames were forced by the violence of the wind in sundry directions, igniting buildings some distance off, whilst for a time several of the intermediate shops escaped. At one time it was feared that the Marylebone Theatre would also have been destroyed, but several land steam-engines having arrived, they were set to work, and stopped the further progress of the conflagration.

The fire was remotely due, probably, to Saturday night's gale. Just at closing-time the wind blew a shop-blind against a jet of gas. The blind caught fire, was hastily rolled up and put away under a counter, and the shop was closed. An hour after the house was in a blaze, from a few sparks, it is suspected, which may have been left in the blind when it was put away. Only one of the twenty-three tradespeople burned out was insured; and these represent a total of something like a hundred persons who are now on the brink of destitution. A meeting on their behalf is to be held on this Friday night.

THE ELECTRIC ORGAN.

MR. BARKER, organ-builder, of Paris (inventor of the pneumatic lever), has just patented, in England and France, a system for applying electricity, to supersede the ordinary moving drawstop and key-action in large organs. The patentee has already built an electric organ of forty-two sounding stops and eight couplers for the church of St. Augustin, Paris; also another for Salon, near Marseilles: both are spoken of as successful. As the largest organs may now be played through a cable of insulated wires, positions hitherto impracticable can be turned to a good account. The organist, with his various claviers, can be placed in any direction and at any distance away from the organ, the touch being equally delicate and rapid on every manual, whether used separately or coupled. Messrs. Bryceson, Brothers, & Co., have the concession for working this patent in Great Britain.

Miscellanea.

UTILISATION OF THE METROPOLITAN SEWAGE.—The report of the Metropolitan Board of Works for 1866-7, just issued, states that the Essex Reclamation Company have commenced the formation of the culvert for taking the sewage down to the Maplin Sands, and for the distribution of so much of it as may be required by the neighbouring farmers in Essex. The Board have had some difficulty in deciding between six tenders received for the utilisation of sewage on the south side of the river, but up to the date of the report they had not come to any definite arrangement.

THE RESTORATION OF ST. NICHOLAS STEEPLE, NEWCASTLE-UPON-TYNE.—At a recent meeting of the Committee of Management of the St. Nicholas' Church Restoration Fund, the following statement as to the financial position of the Restoration Fund was submitted:—The total amount of subscriptions promised was 2,742*l.* 5s. 6d.; of that 1,020*l.* 9s. were still unpaid; leaving actual cash received, 1,721*l.* 16s. 6d. The disbursements had been 1,394*l.* 4s. 5d.; leaving a balance in the bank of 327*l.* 12s. 1d. A letter was read from the contractor, Mr. Walter Scott, giving notice that the works comprised in the first division would be completed in six weeks, and requiring to know the decision of the committee as to commencing with those in the second division: the cost of the two combined will amount to above 4,000*l.* Seeing that only about 2,800*l.* have been promised, it was resolved that the committee would not be justified in giving requisite authority until supported further by the public. The secretary was therefore instructed to issue an urgent appeal for additional contributions.

VENTILATION OF PUBLIC BUILDINGS.—The Institution of Mechanical Engineers have published a report of their annual meeting, held last summer in the lecture theatre of the Conservatoire des Arts et Métiers at Paris, when a paper was read by General Morin "On the Ventilation of Public Buildings." General Morin, like some others, holds that outlets for the escape of bad air should be at or near the floor of a room, and the inlets for fresh air near the ceiling, or at such a height as to prevent the sensation of a draught. The discharge is best effected by "suction," and to maintain this suction nothing more is required than an ordinary fireplace. This being the case, the same system is applicable to ordinary dwelling-houses as well as to public buildings. The displacement of foul air by the mechanical forcing in of fresh air is, General Morin maintains, far less effectual, and requires more attention than the suction system, which is in use in the lecture theatre where the paper was read, as well as at the Théâtre Lyrique, and in certain public schools, where its operation is said to be satisfactory. By passing under the seats of the lecture theatre the General stated, "he had felt completely stifled by the poisonous atmosphere drawn off from the room."

SOCIETY OF ENGINEERS.—At the next meeting, 2nd March, a paper "On the Surveys of proposed Lines for a Ship Canal between the Atlantic and Pacific, on the Panama Railroad, and on the Darian Ship Canal," will be discussed.

FIGURED GLASS.—Messrs. Wenden & Fussell have devised a mode of producing ornamental patterns on ground glass, to serve as a blind Though produced without burning, it is stated to be perfectly durable, and to stand the test of sulphuric acid and other obliterating agents. The method is applicable to the largest sized plate, and is very cheap.

THE PUBLIC WORKS OF HUNGARY. — Some English gentlemen (amongst whom are a duke and two lords) are expected in Paris, according to the *Morning Post's* correspondent there, in order to examine and take into consideration a concession offered to them by the Hungarian Government for carrying out all the public works of Hungary. Count Karolyi and two other Hungarian gentlemen represent Hungarian interests.

NORFOLK AND NORWICH ARCHÆOLOGICAL SOCIETY.—The annual meeting of the members of this Society has been held at the Guildhall, Norwich, under the presidency of the mayor (Mr. J. J. Colman). The Rev. C. R. Manning, hon. secretary, read the report, after which the sheriff, Mr. R. Fitch, read a paper on the discovery of flint implements at Santon Downham, and the Rev. G. W. Minns one on some panel paintings on the rood-screen in Thornham Church.

SICILY.—In Sicily, on one of the plateaux of the Cassaro mountain, ruins have been discovered which indicate the existence of a great city, whose origin dates from the period when a colony of Syracusans established themselves in this spot. According to the historians, this city can be no other than the ancient Castro. The walls have a development of 2,154 yards, and are 9 ft. 10 in. thick; the materials are stratified marly limestone, well chiselled. The entire circumference of the town is about 6,400 yards. It was divided into many quarters, and in the eastern portion the ruins of a temple are visible. Not far from this city there exists another locality called Castro-Novo, of very ancient origin.

THE BARNSLEY NEW WATERWORKS.—These works have been completed. The supply is obtained about nine miles from Barnsley. The water-shed is about 1,700 acres. A storage reservoir, which covers about 70 acres, is 60 ft. deep, and at the present time contains about 40 millions of cubic feet of water. The entire length of pipes is about 8¼ miles. The pressure at the town end has been 25 lb. to the square inch. The hardness of the water is about 3 degrees. The contract for the construction of the reservoir was let, in May, 1864, to Messrs. Skelton & Pratt, of Halifax, for the sum of 22,918*l.*; and that of pipe-laying to Mr. Joseph Taylor, of Flockton Hall, for 2,352*l.* The total amount of money borrowed on account of the water-works is 75,000*l.*

NEWSPAPER PRESS FUND.—A general meeting of the members of the Newspaper Press Fund took place on the 22nd. Mr. G. Godwin, senior vice-president present, presided. The report congratulated the members on the gradual increase of the Society. The number of members now on the roll-book is 210. In London there are 147, of whom 47 are life, and the remaining 100 ordinary, members. In the country there are 63 members, of whom 9 are life, 17 subscribing 1 guinea, and the remaining 37 half a guinea to the fund. The invested capital of the society now amounts to 3,822*l.* 11s. 7d., consisting of 3,122*l.* 11s. 6d. in the New 3 per Cents., and 700*l.* in the Great Indian Peninsular Railway debentures. Whilst earnestly entreating the members generally to co-operate with them in inducing others of their professional brethren to join the institution, the committee anticipated very successful results (already becoming apparent) from the efforts they had recently been making to acquire a large accession of members from the provinces. The balance-sheet, in addition to the amount specified as being invested in the Funds, &c., showed a balance at the bankers' and in the hands of the secretary, of 425*l.* 18s. 7d. The report was unanimously adopted. Some alterations were then made in one of the rules, Mr. Mould, Mr. Hyde Clark, Mr. Grunoisen, and others taking part.

THE LATE PROFESSOR M'GAULEY. — Her Majesty has, on the recommendation of the Earl of Derby, granted 60*l.* from the royal bounty fund to the widow and family of the late Professor M'Gauley, formerly editor of the *Scientific Review*, and for some time lecturer on natural philosophy to the Board of Education in Ireland. As the subscription list will shortly close, it is earnestly requested that additional subscriptions may be sent without delay to the treasurer of the fund, Mr. Robert Richardson, C.E., 26, Great George-street, Westminster.

SANITARY REFORM AT DORKING.—Mr. Baldwin Latham, C.E., president of the Society of Engineers, has delivered a lecture on "Sanitary Reform," at the Red Lion Assembly Rooms, Dorking. The Rev. W. H. Joyce presided, and there was a large attendance of the chief ratepayers of the parish. The chairman, in introducing the lecturer, said, from his own personal experience he could speak of the necessity of something being done in Dorking to remedy the defective drainage of the place. Mr. Latham said, on opening his lecture, that he did not intend to speak particularly of Dorking, or to needlessly frighten them with the state of things in existence there, but rather to give them matter for careful thought and consideration, and to lead them to adopt such measures as the light of science had provided to contend with these difficulties.

BOARDS OF ARBITRATION BETWEEN EMPLOYERS AND WORKMEN.—A public meeting has been held in the Guildhall, Derby, at the instigation of the members of the Derby Chamber of Commerce, to hear an address from Mr. A. J. Mundella, of Nottingham, on the growing importance of Boards of Arbitration to adjust differences between employers and workmen, and to consider the expediency of establishing such a board for this town and neighbourhood. The hall was crowded with working men, hundreds being unable to obtain admittance, and the proceedings throughout were of the most orderly and enthusiastic character. A resolution was unanimously passed that a Board of Arbitration should be established in Derby similar to that at Nottingham; and arrangements were made for obtaining a committee of workmen. It was stated by a workman that there were no builders members of the Derby Chamber of Commerce.

SODA WATER ON A LARGE SCALE.—A curious geological phenomenon lately took place at the thermal establishment of Saint-Alban, while a slight repair was being made to the Cæsar Well. The water had to be lowered some centimètres, when, all of a sudden, a loud subterranean noise was heard, and the springs, which usually gave off a great quantity of gas, but in a calm bubbling way, were really put in ebullition. The gasometers of the establishment, which ordinarily take half a day to be filled, were all raised to full height in a few minutes. Since this occurrence effervescing lemonades and soda water have been increasingly produced. It is also a remarkable fact, the mineral water has become stronger of the salt, which consists of a mixed bicarbonate of iron and other substances. The village is in the commune of Saint-André d'Apchon, on the left bank of the Loire (Department of the Loire), and contains only 150 inhabitants. It is about 1,300 ft. above the level of the sea.

THE NEW AGRICULTURAL HALL AT WALSALL.—The plans for this building show that the arrangement of the ground-floor comprises a hall 80 ft. by 50 ft., with two ante-rooms and a stage, which, including the orchestra platform, is equal to 36 ft. by 30 ft. The roof is constructed partly of wood and partly of iron, and is in the form of a hexadecagon, or half of a sixteen-sided polygon, and ornamental cast-iron columns are introduced to support the roof in lieu of masonry. Under about one-half of the span of the hall a series of vaults are arranged. The upper floor comprises a secretary's room and retiring-rooms. The side walls of the hall are shown to be of red brick, with bands and panels of white bricks, and the main cornice is to be constructed of ornamental, moulded, and perforated brickwork. The end walls are to be of white bricks, relieved with bands of red bricks. The white brickwork is to be executed with the Hednesford Colliery Company's bricks. The principal entrance has double pilasters, supporting a frieze and cornice, over which is a large semi-circular window. On either side are triple windows, with semi-circular heads. The stonework is to be executed with Hellington, Bath, and Codsall stone. Mr. Nicholas is the architect.

HYDE PARK DRINKING FOUNTAIN.—H.R.H. the Duke of Cambridge is to open the Hyde Park Drinking Fountain, of which we recently gave a view, on (this) Saturday, the 29th inst.

MASONIC HALL FOR GATESHEAD.—Masonic halls are rising in many directions. The craft is largely supported in Gateshead and neighbourhood, and it is the intention of the freemasons to erect a hall in Gateshead. We learn from "Oberon's" communication in the *Gateshead Observer* that the building will be almost immediately started with; that Messrs. Charles Bass and J. Stokoe are the secretaries; and that the style of the structure will be Gothic. The building will be erected on an open space in West-street.

A NEW CHURCH FOR ST. OSWALD'S PARISH, CHESTER.—The Dean of Chester, in a letter, invites attention to the desirability of building a new church for this parish, and restoring the south transept of the Cathedral. The screen in the Cathedral, he states, which was intended to make it possible that both services should be carried on simultaneously, has failed in its object; and thus the Cathedral and St. Oswald's Church are inevitably hinderances and annoyances to one another; and every day makes it more evident that the general restoration of the Cathedral, which has long been contemplated, ought to be begun without much delay. Under these circumstances the scheme which he recommends is not the building of a chapel of ease on the new site, but the building a large parish church on the new site, where ample space is secured both for vicarage and for schools.

GAS.—The Redhill Gas Company have declared a dividend of 8 per cent. at their eighth annual meeting. The chairman said they had reduced the price of gas to 5s. 6d. per thousand, and he hoped they might soon bring it down to 5s. The increased consumption, he added, justified the remark he made last year, when many of the shareholders asked the directors to wait a little longer before making any reduction. He then stated and estimated that their loss would not be great, if any, and the revenue of last year had more than realised what he thought it would be.——The directors of the Gloucester Gas Company recommend dividends of 10*l.* per cent. per annum on Class A Shares, and an additional 5*l.* per cent. per annum in reduction of the arrears of dividends due to this class of shareholders; 7*l.* 10s. per cent. per annum on Class B Shares, and 2*l.* 10s. per cent. per annum, being the balance of arrears of dividend due to them. There will besides be left a balance to be carried over to the next half-year of 212*l.* 5s. 5d. They say the result of the last year's working must be highly satisfactory to the shareholders. ——At the annual meeting of the Bodmin Gas Consumers' Company a dividend of 6 per cent. per annum was declared, leaving 51*l.* to be applied towards plant. The consumption of gas has steadily increased.

ST. JAMES'S TOWER, TAUNTON.—The present position of affairs relative to the destruction of this tower has given archæologists another opportunity to advocate its preservation. The Rev. Thomas Hugo thus writes on the subject: "I have long felt that, until the gentlemen who wished to destroy this ornament of Taunton were beaten by a large majority in a parish meeting, it would be waste of time and words to plead for its conservation. Of that *desideratum* we are now in the enjoyment, and the field is open to one who desires, as a townsman, to urge upon the majority the preservation and not the destruction of a building which possesses for many of us a most sacred interest. Of its beauty I presume it is needless to speak. There is nothing equal to it for many a long mile round. Of its soundness and the consequent absence of any necessity for its removal, I gladly accept the deliberate judgment of my friends, Messrs. Ferrey & Metford, the opinion of either of whom would for me be sufficient, while their united voice is irresistible. . . . . What I would very respectfully propose is, that Mr. Ferrey should be commissioned to examine and report on the structure, and that tenders should then be obtained for carrying his suggestions into action. If I mistake not, the result would be very acceptable, even on the score of expense, to the great majority of the parishioners, while not a few outsiders would, like myself, give their ten guineas towards such conservation, and thus lighten the burden, if so it should be called, of those to whom the duty more especially belongs."

EXHIBITION OF FINE ARTS AND INDUSTRY AT LEWES.—The Lewes and East Sussex Exhibition at the County Hall promises to be a success. On the opening day the number of visitors was considered large for a half-crown day, there being 500 present.

THE METROPOLIS SUBWAYS BILL.—Mr. Ayrton has obtained leave in the Commons to introduce a Bill,—similar to the Bill of last session,—to make provision respecting the use of subways constructed by the Metropolitan Board of Works in the Metropolis. The Bill has been read a first time.

WORKMEN'S INTERNATIONAL EXHIBITION, 1869. An executive committee has been appointed to undertake the necessary arrangements for this exhibition by the honorary council chosen at the public meeting in St. Pancras Vestry-hall, under the presidency of the Hon. Auberon Herbert, M.A., on the 14th of October.

NOTTINGHAM LITERARY AND PHILOSOPHICAL SOCIETY.—The annual *conversazione* was held on the 19th inst., when the president and others delivered short addresses. There was an interesting collection of antiquities, photos, and so on, including an extensive series of specimens, illustrating the manufacture of Venetian glass, mosaics, &c., from Messrs. Salviati.

GEOLOGICAL STRATA-CUTTER.—A machine, for boring for coal, made by Mather & Platt, of the Salford ironworks, is being used on the Walton estate, near Wakefield. The coal and other strata come up in solid discs nearly 4 in. in diameter, much as cheese does when cut out by the taster, so that, when put together, these discs show complete sections of the various strata from the top downwards.

CLEANSING STONE BUILDINGS.—Mr. Hurwitz is cleansing the back part of St. Paul's Church, Covent Garden, as an experiment, by means of a process patented by M. Nivert,—namely, by a jet of warm water from an engine instead of cold. The water is drawn up into the engine and warmed by a jet of steam by means of the "Injector," an English invention. The French patent would seem to be merely for the application of the Injector to this particular purpose. The end of the hose is held in the left hand by a man in water-proof dress, who follows up the application with a scrubbing-brush.

BURSTING OF A CANAL EMBANKMENT AT DUDLEY. The embankment of the canal, near the old workhouse, has given way, at the branch point belonging to Messrs. Dixon, of Horsley. For nearly a mile the canal was drained, and many of the boats were thrown helter-skelter by the rush, and several were broken in half, while all were more or less injured. By the stoppage of the New Horsley furnaces a great number of hands are thrown out of employ. It is supposed that it will be at least three weeks before the damage caused by the outburst can be repaired. The accident, it is conjectured, was caused by the mining operations underneath the embankment.

THE MAGNET AS A STOVE.—An experiment made by M. Louis de Henry is cited to illustrate the correlation of physical forces. If a glass flask, it is said, be placed on a small copper plate, and a magnet with its poles pointed upwards be made to revolve rapidly in a vertical axis below this plate, an increased temperature in the air of the flask will be observed, which may be made sensible by any particular arrangement. It is supposed that, by substituting for the plate and glass a copper vessel containing water, sufficient heat may be generated by the rapid action of the magnet to cause the water to boil. But would not heat be generated in such a case whether the apparatus had magnetic power or not?

LOOK TO YOUR DEPOSITS IN FOUNDATION STONES. A bottle, containing important documents and curiosities, inserted at the ceremonial of laying the chief stone of the Bolton parish church, has been abstracted. It is believed that the robbery must have been committed by some of the workmen on the premises. The few current coins which the bottle contained were only of the value of 1*l.* 3*s.* 10½*d.* Mr. Ormrod, who gave 30,000*l.* to re-build the church, and who laid the stone, visited the spot; and another bottle, with contents *fac simile* as far as possible, will be prepared. The thieves will thus be prevented, no doubt, from proving to future generations how much churches must have been needed in the nineteenth century.

ARTISANS' ESSAYS.—A second collection of Artisans' Essays on the comparative merits of British and Continental Industry and Manufactures, will shortly be published. These essays will receive the prizes offered in connexion with the Paris Excursion Committee.

THE LATE MR. JOHN HERAPATH.—Mr. John Herapath, proprietor of *Herapath's Railway Journal*, and the cousin of Mr. William Herapath, the chemist of Bristol, whose death was announced a few days since, died on the 24th, at his residence, Catford Bridge, Kent. Mr. Herapath was engaged in completing his concluding volume of "Mathematical Physics" for publication, when he caught a cold which, though it at first appeared to be slight, terminated in his death.

MUSEUMS.—A conference of persons of various classes interested in the provision of museums and libraries for the people, together with supporters of sundry social, educational, philanthropic, and religious organizations, will take place under the auspices of the Public Museums and Free Libraries Association, on the 9th of March, at Sion College, the use of which has been kindly granted for the purpose. The president of the college, the Rev. William Rogers, M.A., canon of St. Paul's, will occupy the chair.

VALUE OF PROPERTY IN NEW-STREET, BIRMINGHAM.—The two shops and houses, Nos. 8 and 9, New-street, were lately offered for sale by auction by Mr. R. Clarke, of Clarke & Barrows. The property consists of two shops with houses, and back premises, comprising in the whole about 400 square yards of land. It is practically freehold, being held on a lease of 750 years, at a peppercorn rent, and produces 470*l.* a year. The biddings reached 10,200*l.*; but this offer was declined, and the property was bought in at 11,000*l.*

BLACKHEATH.—In reply to an application to Government for its co-operation in the preservation of Blackheath for recreative purposes, the Office of Woods has stated that the Metropolitan Commissioners Act, 1866, provides a course of procedure in such cases which the memorialists must comply with; and that her Majesty is expressly empowered, for the purposes of a scheme under that Act, to let the land to any person, or otherwise make use of it. The popularity of Blackheath as a place of recreation for the working classes may be inferred from the fact that it is frequently visited on a single day by 80,000 persons.

TENDERS.

For sewering, paving, curbing, channels, and other works, in Victoria-road. Quantities supplied by Mr. W. Rowley:—

Wainright	£1,860 16 6
Jeffries	1,400 9 8
Benthall	1,391 12 8
Martin	1,372 4 2
Beevons	1,333 6 4
Booth	1,315 7 5
Knight (accepted)	1,275 9 7

For tower and spire to Christ's Church, Wanstead. Mr. John T. Bressey, architect:—

F. & F. J. Wood	£2,240 0 0
Reave	2,174 0 0
Perry & Co.	2,123 0 0
Enor	1,988 0 0
Hedges	1,956 0 0
Binns	1,395 0 0
Mundy & Hutchinson	1,370 0 0

For alterations of shop front and house, 70, East-street, Brighton, for Mr. Booth. Messrs. Goulty & Gibbons, architects:—

Chappell	£650 0 0
Cheesman & Co. (accepted)	428 0 0

For St. Peter's Free Schools, Albion-road, West-end, Hammersmith. Mr. G. A. Burn, architect:—

Stimpson	4,663 0 0
Braithwaite	4,617 0 0
Dove, Brothers	4,149 0 0
Adamson	3,995 0 0
Myers	3,938 0 0
Mansell	3,795 0 0
J. & E. Bird	3,755 0 0
Chamberlain	3,687 0 0
Scrivener & White	3,677 0 0

For erecting a detached residence and stables at Stamford-hill. Mr. Thomas J. Hill, architect:—

Colls & Sons	£3,470 0 0
Moreland & Burton	3,300 0 0
Ashby & Sons	3,125 0 0
Henshaw	2,995 0 0
Pritchard	2,991 0 0
Conder	2,948 0 0
Webb & Sons	2,929 0 0

For new shop-front and alterations to shop in Exmouth-street, Clerkenwell:—

Dove, Brothers	£569 0 0

For villa residence at Belvedere Park. Mr. Thomas Dinwiddy, architect. Quantities supplied:—

	Villa.	Fencing, &c.
Allen	£1,000 0 0	£100 0 0
Knight	819 10 0	112 10 0
Cowland	794 0 0	135 0 0
Nowlan	795 0 0	93 0 0

For new premises, Counter-street, Borough Market. Messrs. Jarvis & Son, architects:—

Henshaw	£1,085 0 0
Thompson	1,075 0 0
Rider & Son	1,060 0 0
Carter	1,037 0 0
Bagueley	1,020 0 0

For new shop-front, No. 85, Borough-road. Mr. William Smith, architect:—

Crabbe & Vaughan	£140 0 0
Sabey	129 0 0
Wilham	125 0 0
Patterson	98 18 6

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